

Volume 4
Issue 3

RISC USER

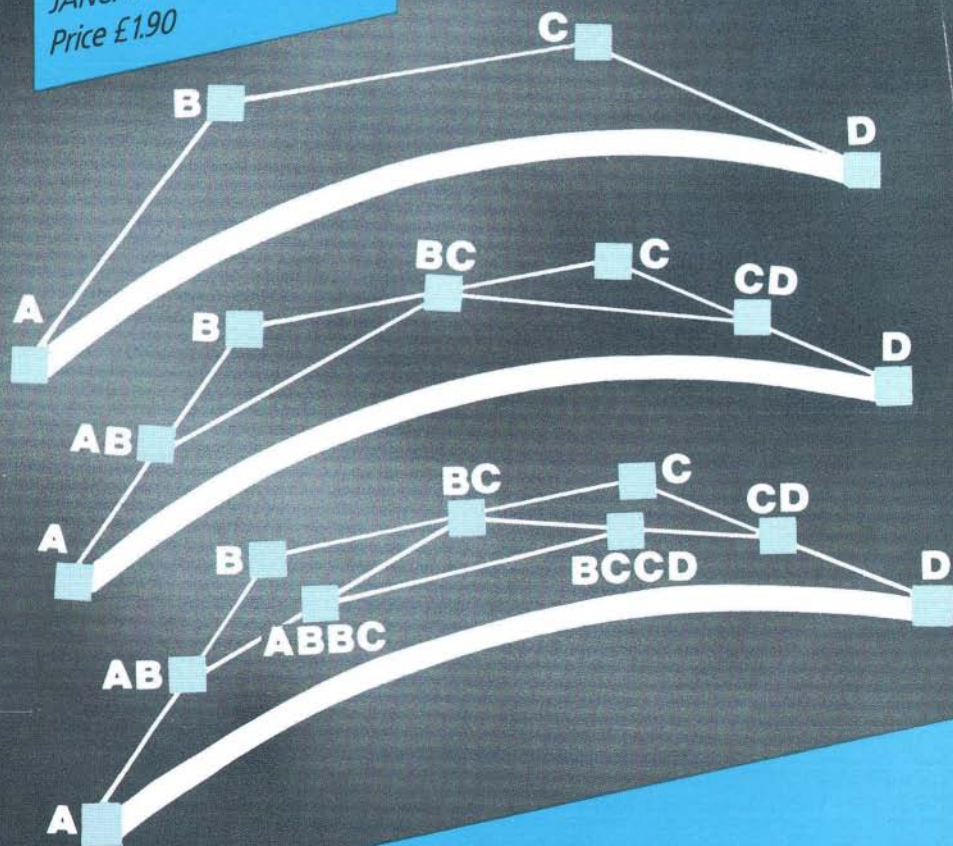
JANUARY/FEBRUARY 1991
Price £1.90

Multi-Tasking Wimp Debugger

Ideas Processor

Irlam's Colour Scanner

ArcLight Review



Bezier Curves

The magazine and
support group
exclusively for users
of the Archimedes



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RISC
USERTHE ARCHIMEDES
MAGAZINE AND
SUPPORT GROUP

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BACKWARDS REFLECTIONS

One difficulty that always arises when writing an editorial is the time that inevitably elapses between the date when it is written and when you read it. That is never more true than for a two-month issue such as this. All being well, you will receive this magazine by mid-January, yet it is still November at the time of writing. When you read this, our Open Day scheduled for late November will have taken place, as will the Computer Shopper Show in early December not to say Christmas and the New Year.

RISC USER SOFTWARE COLLECTIONS

At RISC User we have been involved in a number of projects all of which will have come to fruition during the pre-Christmas period. First of all, the Volume 3 Special Disc has been a tremendous success, but we must point out that the price has now reverted to £9.95, more in keeping with its true value (but still less than the price for which we have advertised the disc to non-members). We are also very pleased with the ArcOmnibus games disc, and if you ordered this, we hope you enjoyed playing the games it contained as much as we did. Desktop Applications was our third disc collection to be released last autumn, and again, in our view, represents tremendous value for money.

NEW ARCSCAN III

Two further ventures also saw the light of day late last year. ArcScan III, a multi-tasking version of the popular computerised index ArcScan, was released. This version has been completely rewritten (in C) to provide much greater flexibility within the Desktop environment for immediate access while running other Wimp tasks. We have also been able to obtain from Acorn a comprehensive computerised index to Acorn's ANSI C manual which will be included as

standard with ArcScan III. Further developments are under way, and we hope to be able to expand the range of information available for use with ArcScan (offers of other databases are welcome). Note that all existing data files continue to remain fully compatible with this new version of ArcScan.

BEEBUG'S FIRST BOOK

Finally, for 1990, we published our first book, **File Handling for All**. This is wide-ranging in its approach and contains ample material for both newcomer and expert in this fascinating field. The book uses BBC Basic as the medium in which the example programs and routines are written, and therefore does demand at least some prior programming knowledge in Basic if you are to make the most of it. All the programs and routines from the book, plus further supporting programs, have been made available on disc. RISC User members can buy book and disc together at a special member's only price.

PUBLIC DOMAIN SOFTWARE

We also announced the BEEBUG Public Domain Software Library with 12 titles already available plus a PD sampler disc. We anticipate that the number of titles will increase steadily through 1991.

Details, including prices, of all these products are contained elsewhere in this issue.

IN CONCLUSION

Both co-editors would like to thank all contributors for helping to make 1990 a successful year. We hope to have had a well earned rest over Christmas and the New Year, and we will be back with you, hopefully refreshed, in the March issue.

MW. & LC.



SCSI HARD DISC DRIVES AND INTERFACES FOR THE A3000

- From Only £398
- Fast drives in a wide range of capacities
- Quality mechanisms (Seagate, Rodime, etc.)
- Metal case with power supply
- Fully screened SCSI connectors and cable
- Easily daisy-chained to provide multiple drives

Beebug have launched a full range of SCSI hard disc drives for the A3000 with capacities from 20Mbyte to 338Mbyte. These are all half-height quality drive mechanisms housed in an attractive case with an internal switch-mode power supply. Included in the price is a high quality screened SCSI cable and an 8 bit SCSI interface, which fits neatly inside the A3000 module slot. This is supplied with full fitting instructions and may be fitted in minutes. No soldering or specialist skills are necessary.

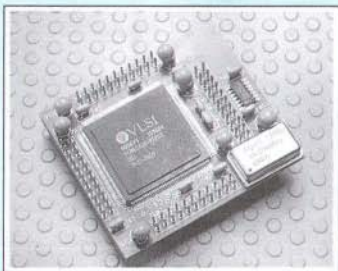
A number of drives may be daisy-chained together to give increased capacity. All drives are supplied with through connectors and the appropriate cables, but units in the middle of the chain require a set of terminating resistors to be removed. We can supply the drives with these already removed. See opposite for ordering details.

SCSI HARD DRIVES INCLUDING A3000 INTERFACE

Stock code	Capacity	Price (ex. VAT)
5220	20Mbyte	£398.00
5221	49Mbyte	£498.00
5222	80Mbyte	£598.00
5224	110Mbyte	£798.00
5223	183Mbyte	£898.00
5225	338Mbyte	£1198.00

Carriage is £8.00 per drive. Add 10 to stock code for drives without terminators (e.g 5220 becomes 5230). Drives are available without interface - deduct £99.

ARM3 PROCESSOR CARD



- Massive speed increase
- Riscware control software
- Comprehensive user guide
- Compact design using latest surface mount technology
- Compatible with all software

Stock code: 0134

£399.00
(+ VAT + £5.50 Carriage)

The ARM3 micro-processor is the latest in the series of Acorn RISC Machine reduced instruction set processors. It is the micro-processor fitted as standard to Acorn's new flagship - the 540.

This new card from Beebug allows a super-fast ARM3 processor running at 32 MHz to be fitted to your Archimedes 300 or 400 series computer. The highly compact circuit board measures just 55 by 60 mm (approx) and contains the latest surface mounted ARM3 processor together with a clock generator circuit.

The ARM3 Card is inserted in place of the existing ARM2 processor and provides a four-fold increase in processor clock speed along with a 4Kbyte cache which serves to isolate the fast processor from the relatively slow RAM. Average speed increases of 3 to 5 times are typical, and unlike speed enhancers such as floating point co-processors, the ARM3 Card improves performance of all software. Users of the PC Emulator will especially benefit from the increased execution speed.

The ARM3 Card is supplied with disc-based software to control the cache operation, both from the Desktop and via star commands. The comprehensive user guide not only covers the control of the ARM3 card at all levels, but also contains details of differences between the ARM2 and ARM3, and a section explaining the theory of cache systems.

Note: The Beebug ARM3 Card must be fitted by an Acorn approved component level service centre, as the existing ARM 2 chip has to be removed. This includes Beebug and many major Acorn dealers. The Beebug ARM3 is unsuitable for the A3000, as the ARM2 processor in this machine is soldered directly to the circuit board.

BEEBUG

Beebug Ltd., 117 Hatfield Road, St Albans, Herts, AL1 4JS.
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Please add VAT at 15%. This advert was produced entirely with *ovation* DTP

ARM TAKES ON A NEW MEANING

Acorn Computers, Apple Computers and VLSI Technology (the company which manufactures the ARM chip) have set up a new company called Advanced Risc Machines Ltd. to exploit the growing market for RISC processors. The company will be based in Cambridge; Acorn and Apple will have equal shares, with VLSI being a smaller shareholder. It is expected that further investors will be attracted to the company in due course. The primary aim of ARM Ltd. is to attack the market for application-specific integrated circuits (known as ASICs), such as portable computers, communications equipment and printers, as well as embedded control applications in consumer electronic products. The ARM chip is ideally suited to such uses as a result of its smaller size and lower power consumption than other RISC chips on the market. Indeed, it is rumoured that Acorn itself is developing a portable Archimedes. However, Apple has made it known that it does not see the ARM as a suitable replacement for the 68000 in its desktop machines, such as the Macintosh.

The first product to appear from the new company will be the ARM600 chip, which will be available in 1991. This will be faster than existing ARM chips, but no further information has yet been released. Further, more powerful ARM chips will follow, with the aim of making the company a major player in the RISC market for the 1990s. Although there will initially be a slight loss of revenue for Acorn, as the new company will derive its income from existing ARM licence arrangements, in the long term the new joint venture should strengthen Acorn's already powerful presence in the RISC market. Acorn Computers Ltd. is at Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN, tel (0223) 245200.

GENESIS II

Software Solutions will launch a new version of its multi-media presentation package, *Genesis*, at the BETT'91 exhibition in January. The new version has a number of significant improvements over the

original, including data compression, direct incorporation of Armadeus files, multi-coloured text and different styles within a single frame, and text formatting options. Fast searching of records (up to 1000 per second) is now claimed. The software will also interface with the Concept Keyboard for educational applications.

The script language has now been expanded into a general purpose programming language. Software Solutions claims that this will allow the user to develop RISC OS applications without needing an understanding of the Wimp system. Genesis II will be available at the BETT exhibition and will cost £172.44 inc. VAT (£114.94 inc. VAT to educational users). Upgrades will be available for existing users of Genesis I. Further details can be obtained from Software Solutions, Broadway House, 149-15 St Neots Road, Hardwick, Cambridge CB3 7QJ, tel. (0954) 211760.

PRISM

XOB, a company hitherto known primarily for its network software, has announced a new art package, entitled *Prism*. The company claims that this is the first art package for the Arc which has specifically been designed for use with RISC OS. Features include the ability to create pictures of up to four times the size of the screen, full-colour printing up to 16 times normal size, full use of the Desktop for all file access and printing operations, fast compression/decompression routines, 256 colours with comprehensive dithering, and a novel tutorial on audio cassette to supplement the printed manual. XOB claims that the range of painting tools and colour-filling facilities is better than any other art package in the Archimedes market. Prism costs £70.38 inc. VAT, and site licenses are also available. For more details, contact XOB, Balkeerie, Eassie (by Forfar), Angus, Scotland DD8 1SR, tel. (030 784) 364.

THROUGH THE ARCHWAY

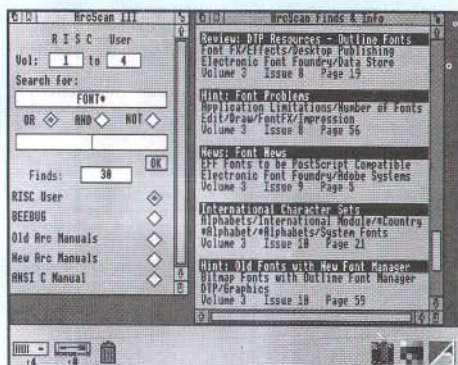
Simtron's *Archway 2*, a package which provides an environment for creating RISC OS applications in Basic, should at last be

ArcScan III

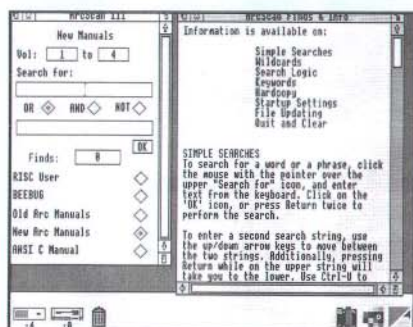
A new multi-tasking version of Arcscan, the customisable magazine database

New features for ArcScan III

- now includes subject and function index to Acorn's ANSI-C manual (Release 3)
- provides flexible keyboard search on any entry
- improved search logic - choice of 3 logical operators: OR, AND and NOT
- features dynamic memory management, returning unused memory to the Wimp
- uses dedicated ARM code routines enabling rapid information retrieval
- finds are displayed in a fast scrolling Wimp window allowing you to browse through all entries retrieved.
- fully user customisable allowing other databases to be automatically incorporated in the control panel display
- a new detailed manual and extensive on-screen help



Searching is almost instantaneous



The on-screen help in action

ArcScan III contains the Following Databases:

- RISC User Volumes 1, 2 and 3
- BEEBUG Volumes 1 - 8

The Indexes to the following major Archimedes manuals:

- Basic User Guide (Arthur)
- Programmer's Reference Manual (Arthur)
- RISC OS User Guide
- RISC OS Basic Manual
- RISC OS Programmer's Reference Manual
- ANSI C Manual (Release 3)

It is simple to perform a search:

1. If you need to know about Obey Files, enter the words 'obey', 'files' and click on the AND logic. All finds in RISC User will be instantly displayed. You can now call up the Acorn Manuals indexes and repeat the search to get further references.
2. To find the SWI name for SWI &400D4, select the new Programmer's Reference Manual from the menu, enter "SWI &400D4", and the answer appears, complete with page references.

ArcScan III Disc + Manual £14.95 members (£18.95 non-members) Stock Code **PAS3**

ArcScan III Upgrade (from ArcScan II) **£4.75** members (£7.95 non-members) Stock Code **PAU3**

Please add 60p p&p. For upgrade, please send the old ArcScan II disc or label.

When ordering please quote your name and membership number.

available by the time you read this. First announced more than a year ago, Archway 2 has now been almost completely rewritten and is much more powerful than originally envisaged. The package contains four discs packed with utilities and examples, and the complete system is fully multi-tasking. Archway has all the facilities needed to create an application, and provides run-time code to handle the Wimp, display graphics (including Paint, Draw and Euclid files), provide file handling and database functions etc., which can be incorporated into the application's programs. All the programmer needs to do is write the Basic procedures to handle the tasks specific to the application. Facilities are also provided to create multiple-document, editor-type applications (such as Edit). Archway 2 costs £99.95 inc. VAT, and details can be obtained from Simtron, 4 Clarence Drive, East Grinstead, West Sussex RH19 4RZ, tel. (0342) 328188.

PORTABLE PRINTER

The Canon BJ-10e is an 80-column bubble jet printer the size of an A4 sheet of paper (though a little thicker!) and weighing only 4.6 lbs. It operates from a NiCad battery pack, making it ideal for portable use, but a mains adaptor and an auto sheet feeder are also available for office use. Maximum resolution is 360 dpi, with a claimed speed of 83 cps for all typefaces. The printer can be supplied in either black or white, and is available from BEEBUG at £343.85 inc. VAT. BEEBUG also has a RISC OS printer driver for the BJ-10e at £17.25 inc. VAT (supplied free when you buy the printer). For further details of the printer, contact Canon (UK) Ltd., Canon House, Manor Road, Wallington, Surrey SM6 0AJ, tel. 081-773 3173.

NETWORK NEWS

Acorn is developing a new fileserver jointly with Software Solutions. Called provisionally the Level 4 Fileserver, it will run on any 1Mbyte Archimedes as a Desktop application or in stand-alone mode. It can transfer files from any media type (floppy, hard disc, SCSI or ADFS, CD-ROM), or use Internet Protocols to

communicate with a remote host via Econet or Ethernet and NFS. It will be compatible with existing Acorn file servers, and the server can also double up as a user machine on lightly-loaded networks. Also included will be printer spooler software which supports multiple printers. The fileserver should be available very soon.

Also for network users is a Broadcast Loader, designed to overcome the problem of many users needing to download the same application at the same time. The broadcast loader module enables files to be broadcast across the network and loaded by all users simultaneously. BBC micros may exist on the same network but cannot participate in the broadcast transmissions. This will also be available shortly. For details of all Acorn products, contact Acorn Computers Ltd., Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN, tel. (0223) 245200.

REMOVABLE SCSI DRIVES

Norwich Computer Services has launched a range of removable 42 Mbyte SCSI hard drives for the Archimedes. These were originally designed for the Apple Macintosh, but the availability of SCSI interfaces has enabled the drives to be used on the Arc. The average access time is 25 milliseconds, and the drives are claimed to be extremely robust. Because the disc unit is removable, the data can be made secure. The price of the drive, including one 42 Mbyte disc, is £585.00 inc. VAT. Extra 42 Mbyte discs cost £80.00 inc. VAT each. For further information, contact Norwich Computer Services, 18 Mile End Road, Norwich NR4 7QY, tel. (0603) 507057.

PSION TO ARC

BEEBUG is now marketing an Archimedes link to accompany the Psion Organiser Comms Link kit. It contains an adaptor to convert the Comms Link cable for use on an Arc, plus simple to use software, based on RISC User's *PsionComm* utility originally published on the Volume 3 Issue 6 magazine disc. The Archimedes Link costs £26.39 inc. VAT and is available from BEEBUG.

RU

Bicubic Parametric What?

A first look at Bezier Curves

Derek Marriott gives the lowdown on Bezier curves, and their application - this month curve drawing.

Bezier curves appear to have become quite popular in the last couple of years, especially in the Archimedes world, as the way of drawing curves, and are extensively used by the Draw application. Bezier curves are by no means the only way of drawing mathematical shapes, but they have become widely used because of a simple technique which removes all the complicated. We will look briefly at the theory involved, but then concentrate on how Bezier curves can be drawn with simple programs avoiding much of the theory. Such routines can be easily incorporated into your own programs.

SOME THEORY

So where shall we start? How about a bit of maths, which seems a good idea since we are dealing with curves. Let's look at the formula for a Bezier curve, just to frighten the non-mathematicians among you:

$$P(u) = \sum_{i=0}^n P_i B_{i,n}(u)$$

where $B_{i,n}(u) = C(n,i) u^i (1-u)^{n-i}$ and $C(n,i)$ is the binomial coefficient:

$$C(n,i) = n! / (i!(n-i)!)$$

Do you remember now why you used to hate maths at school? So what does this mean?

Now u is in the range $[0,1]$, i.e. u can take values between and including 0 and 1, and this is the region for which the line exists. So to draw the curve we start with $u=0$ and increase u until $u=1$, putting the values in the formula. P is a vector, be it in two or three dimensions, which is the output of the formula. If we are using two dimensions we can simply plot the output to the screen, but in three dimensions some transformations are needed.

n is the number of control points, those little squares you can move around in Draw. There are conventionally four control points, so $n=3$ (since $i=0$ initially), and we have each control point named P_0 , P_1 , P_2 and P_3 . P_0 and P_3 are the end points where the curve starts and ends respectively, and these are the only control points the curve is guaranteed to go through, as can be seen by playing with Draw. We shall stick with $n=3$ and evaluate $B_{i,n}(u)$ for the four different values of i :

$$B_{0,3}(u) = (1-u)^3$$

$$B_{1,3}(u) = 3u(1-u)^2$$

$$B_{2,3}(u) = 3u^2(1-u)$$

$$B_{3,3}(u) = u^3$$

This is a reasonably simple function. The B stands for 'Blending' as it is the function which blends or smoothes the curve between the control points. It can easily be seen why the function starts at P_0 and stops at P_3 (put $u=0$ and $u=1$ into the above equations and see what you get). Note how these functions get their names: the degree of u (the highest power) is 3 i.e. a cubic, and u is a parameter, so we have a parametric cubic curve.

Hopefully you now understand something of the formula, so we can write a program to draw a curve very simply, using the formula as the basis of the program:

For each u do

For each control point do

**Multiply the control vector by $B_{i,3}(u)$
and sum all the vectors produced
Draw this point on the screen**

Simple really, as listing 1 shows. The only problem, as you will see if you run this program, is that it is so slow. So how does Acorn's routine work?

SIMPLE BEZIER CURVES

Fortunately, there is a better (faster) way to draw these curves. If we look at the output from this algorithm, we see, to be honest, very little, but if we include the control points, and play around with lines, a pattern appears. So let's play a game:

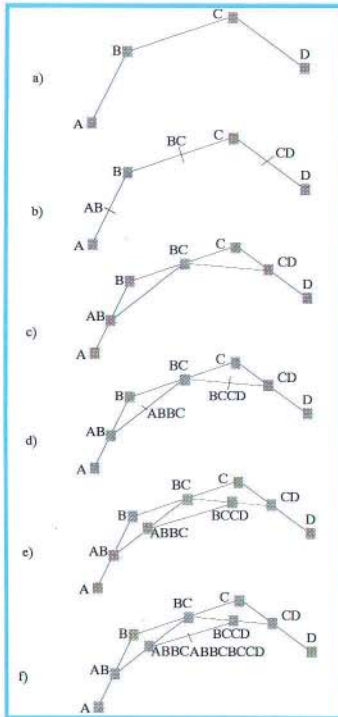


Figure 1

(Fig. 1f).

g) Repeat the above process substituting the new points for A, B, C, and D as:

$A = A, B = AB, C = ABBC, D = ABBCBCCD$
and:

$A = ABBCBCCD, B = BCCD, C = CD, D = D$

So what have we done? We started one curve specified by four control points, but by the time we have completed stage g) we have two curves, each specified by their own four control points. If we repeated

a) Draw four control points and label them A-D, and join the points (as in Fig. 1a).

b) Mark the half way distance between adjacent pairs of points, i.e. take the line AB and mark its mid point as AB (Fig. 1b).

c) Join AB to BC, and BC to CD (Fig. 1c).

d) Mark the halfway point between AB and BC, and between BC and CD (Fig. 1d).

e) Join ABBC to BCCD (Fig. 1e).

f) Mark the mid-point of the line ABBC - BCCD

this again, we would have four smaller curves. And what is more, each time we split the curve we are getting closer to the analytic curve given by the formula. So the initial control points could be considered a very crude approximation to the curve, and for each division of the control points, the approximation becomes closer to the original (the approximation tends to the curve).

We can now get a drawing of the curve without referring to the formula at all, which is good since it had lots of multiplication and addition in it, and all this revised method needs is a few additions and division by two, which is what computers are good at anyway.

Listing 2 demonstrates this technique in action, and follows the above procedure well. That is it recursively divides up the line. The number of subdivisions defines the coarseness of the curve; 0 just joins the original control points; higher values increase the resolution. Of course, you could go on dividing forever, but the screen resolution sets the practical limits. There's no point dividing further if the results can't be seen on the screen.

THE NOTION OF 'FLATNESS'

Imagine the situation in Fig 2 - all four control points lie in a straight line. There seems little point subdividing this 'curve' since we'll just get two straight lines,

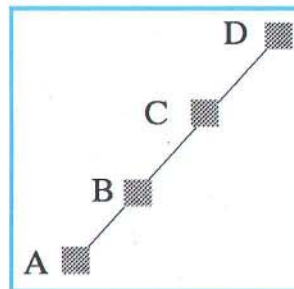


Figure 2

which take twice as long to draw (try it). So, to overcome this, we can introduce the new notion of 'flatness' to our curve.

That is, we must decide when the curve is close enough to a straight line that there is little point in subdividing it further. Fig. 3a shows how

Bicubic Parametric What?

Lengths d_1 and d_2 are the perpendicular distances of the points B and C respectively from the line joining A and D. So we declare a constant *Flatness* which is a scalar to which we compare d_1 and d_2 . Fig. 3b shows that if d_1 and d_2 are both less than *Flatness* then our curve will be

considered straight (if you see what I mean), or if either length is greater than *Flatness* the curve needs subdividing to another level at least (Fig. 3c). Now we can alter the *Flatness* according to how we want the curve to appear. We could have a high *Flatness* for a preview of the image and then a low value for the final copy, or we could relate the *Flatness* to the size of the image on screen. For example, *Flatness* is inverse-

ly proportional to the image size. The term *Flatness* is used in the routines used by Acorn in the Draw Module, so now you know where the term comes from.

To achieve this we need to modify Listing 2. The following six lines should be modified as shown:

```
140 PROCbeziercurve(P(),1E8)
190 PROCbeziercurve(P(),Flatness)
230 DEF PROCbeziercurve(P(),Flatness)
300 IF FNflatenough(P(),Flatness) THEN
470 PROCbeziercurve(A(),Flatness)
480 PROCbeziercurve(B(),Flatness)
```

then append the following extra procedure:

```
700 DEF FNflatenough(P(),Flatness)
710 REM Returns TRUE if the curve OK
720 LOCAL a, b, c
730 a = P(0,y%) - P(3,y%)
740 b = P(3,x%) - P(0,x%)
```

```
750 c = P(0,x%)*P(3,y%) - P(0,y%)*P(3,x%)
760 IF ABS((a*P(1,x%)+b*P(1,y%)+c)/SQR
(a*a+b*b))>Flatness THEN
770 =FALSE
780 ELSE
790 IF ABS((a*P(2,x%)+b*P(2,y%)+c)/
SQR(a*a+b*b))>Flatness THEN
800 =FALSE
810 ELSE
820 =TRUE
830 ENDIF
840 ENDIF
850 =FALSE :REM Shouldn't get here
```

This produces Listing 3 which shows this technique in action. This is called *non-uniform sub-division* as each curve is not necessarily split into equal parts, whereas the previous program did (that method is called, not so surprisingly, *uniform sub-division*).

So now we can draw curves reasonably quickly from Basic. The first method shown is of little practical use, as it is so slow, but it does have its uses when the geometric properties of the curve are required. For any real application the subdivision method is best as employed in either of the forms given here. Next month we shall go on to develop these curves into surfaces called *patches*.

Listing 1

```
10 REM >Bezier1
20 REM Program Bezier Function
30 REM Version A1.0
40 REM Author Derek Marriott
50 REM RISC User Jan/Feb 1991
60 REM Program subject to copyright
70 :
80 MODE 12:GCOL 128:CLG
90 step = 76 :REM Number of lines
100 DIM P(3,1):REM The control points
110 x%=0:y%=1 :REM Constantsr
120 PROCsetupcontrol
130 REM Show the control points
140 GCOL 1:MOVE P(0,x%), P(0,y%)
150 FOR i%=0 TO 3
160 DRAW P(i%,x%), P(i%,y%)
170 NEXT
180 GCOL 7:REM Now draw curve
190 MOVE P(0,x%), P(0,y%)
200 FOR u=0 TO 1 STEP 1/step
```


Bicubic Parametric What?

```

210 x=0 : y=0
220 FOR i%=0 TO 3
230   x+=P(i%,x%)*FNB(i%,u)
240   y+=P(i%,y%)*FNB(i%,u)
250 NEXT
260 DRAW x, y
270 NEXT
280 END
290 :
300 DEF FNB(i%,u)
310 REM The blend function
320 LOCAL r
330 CASE i% OF
340   WHEN 0:r=(1-u)^3
350   WHEN 1:r=3*u*(1-u)^2
360   WHEN 2:r=3*u*u*(1-u)
370   WHEN 3:r=u*u*u
380 ENDCASE
390 =r
400 :
410 DEF PROCsetupcontrol
420 REM Set up control points
430 LOCAL loop%
440 FOR loop% = 0 TO 3
450   READ P(loop%,x%), P(loop%,y%)
460 NEXT
470 ENDPROC
480 :
490 REM Defines the curve to be drawn
500 DATA 100,100, 300,700, 600,800, 10
00,110

```

Listing 2

```

10 REM >Bezier2
20 REM Program   Recursive Division
30 REM Version   A1.0
40 REM Author    Derek Marriott
50 REM RISC User  Jan/Feb 1991
60 REM Program   Subject to copyright
70 :
80 MODE 12:GCOL 128:CLG
90 DIM P(3,1) :REM The control points
100 x%=0:y%=1 :REM Constants
110 PROCsetupcontrol
120 REM Show the control points
130 GCOL 1
140 PROCBeziercurve(P(),0)
150 GCOL 7
160 REPEAT
170   PRINT TAB(0,0);SPC34
180   INPUT TAB(0,0);"Number of divisions ";Num%
190   PROCBeziercurve(P(),Num%)

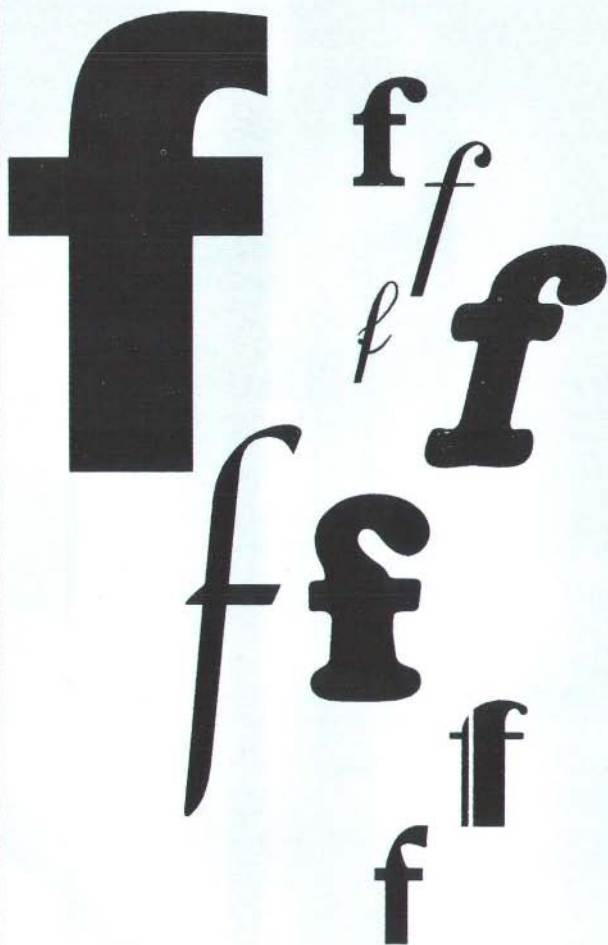
```

```

200 UNTIL FALSE :REM Escape to quit
210 END
220 :
230 DEF PROCBeziercurve(P(),Num%)
240 REM Num% is the number of times to
250 REM subdivide, P() is the control
260 REM vector defining the (a) curve
270 LOCAL A(), B(), loop%, temp
280 REM Local arrays to divide curve
290 DIM A(3,1), B(3,1)
300 IF Num%=0 THEN
310   REM No more division
320   PROCdrawcurve(P())
330 ELSE
340   REM Let's divide
350   FOR loop%=0 TO 1
360     temp      =(P(1,loop%)+P(2,loop%
370   ))/2
380   A(0,loop%)=P(0,loop%)
390   A(1,loop%)=(P(0,loop%)+P(1,loop%
400   ))/2
410   A(2,loop%)=(temp+A(1,loop%))/2
420   REM come back to A(3,) later
430   B(3,loop%)=P(3,loop%)
440   B(2,loop%)=(P(2,loop%)+P(3,loop%
450   ))/2
460   B(1,loop%)=(temp+B(2,loop%))/2
470   A(3,loop%)=(A(2,loop%)+B(1,loop%
480   ))/2
490   B(0,loop%)=A(3,loop%)
500 NEXT
510 PROCBeziercurve(A(),Num%-1)
520 PROCBeziercurve(B(),Num%-1)
530 ENDIF
540 ENDPROC
550 :
560 DEF PROCdrawcurve(P())
570 MOVE P(0,x%),P(0,y%)
580 DRAW P(1,x%),P(1,y%)
590 DRAW P(2,x%),P(2,y%)
600 DRAW P(3,x%),P(3,y%)
610 ENDPROC
620 :
630 DEF PROCsetupcontrol
640 REM Set up control points
650 LOCAL loop%
660 FOR loop% = 0 TO 3
670   READ P(loop%,x%), P(loop%,y%)
680 NEXT
690 ENDPROC
700 :
710 REM Defines the curve to be drawn
720 DATA 100,100, 300,700, 600,800, 10
00,110

```

RU



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A Multi-Tasking Wimp Debugger

by Lee Calcraft

When developing Wimp-based multi-tasking applications for the Archimedes, debugging can present quite a problem. If you are testing your program from within the Desktop it is difficult to extract information from it while it runs. You can use VDU4 followed by a PRINT statement, but this has its disadvantages. It leaves text on the Desktop, and is not well suited to displaying quantities of information.

The Wimp application described in this article overcomes the problem. It allows you to send data from a program under test to the window of the Debugger - a separate multi-tasking application. The Debugger runs from the icon bar, and has a single window which displays 10 numbered lines of text. To make use of it, you include a simple procedure in the program you are testing, and make a call such as:

```
PROCdebug(0,"A Button has been pressed")
```

This will cause the text to appear in the top line of the debugger window. A second procedure can be used which will display a variable and its value - for example:

```
PROCdebugvv(3,"Frame count",fcount%)
```

This will cause line 3 of the debugger window to display the words "Frame count" together with the value of *fcount%*. The debugger display is refreshed each time the task under investigation makes a debug call, so that the debugger can give dynamic information about a running task.

The Debugger has a three-option menu from the icon bar, offering Clear, Refresh and Quit. The first option clears the debugger display, while the second refreshes the display with the last-issued information on each of the ten display lines (see later for clarification).

SETTING UP

To make use of the Debugger, you will need to create an application directory named !Debug containing a suitable sprite, a !Run Obey file and a !RunImage file. Listings for the two files are given below. The easiest way to create the application directory, the sprite and the

!Run file is to use our Application Shell Generator (RISC User Volume 3 Issue 2, and also the Volume 3 Special Disc).



Using the Debugger

To test the Debugger, click on its icon on the icon bar. This should open the task's only window. Now press F12 to get the star prompt, and type the following two lines:

```
*SET db$mess XX
```

```
*SET db$mess0 String zero test
```

Now press Return to get back to the Desktop, and you should see that line zero of the Debug display reads:

```
0:String zero test
```

HOW IT WORKS

The debugging system uses eleven system variables to pass messages from the test task to the Debugger. Using this method rather than the Wimp's own message passing system has the advantage that it allows us to resort to using *Show to pick up messages from the task under test even in the event of the loss of the Desktop. It also means that the Debugger can be installed some time after the test program has run, and still pick up any messages which it has left (use the Refresh option).

The variables *db\$mess0*, *db\$mess1*, etc. are used for the 10 strings which are displayed by the Debugger. An eleventh string *db\$mess* is used to tell the

Debugger that the test task has altered one or more of the strings. The Debugger then reads and displays the state of the remaining ten, and sets *db\$mess* to null. In this way, although the Debugger acts on every null Wimp Poll reason code, it returns very quickly because it is only checking the state of one variable.

Having covered the way in which the system works, we can see the point of the Debugger's top two menu options. Clear not only clears the Debugger display, but it also clears all eleven of the system variables. In fact, it clears the group of ten, then puts the string "XX" into *db\$mess* (though any non-null string could be used). Then next time around the poll loop, it spots that *db\$mess* is not null, so updates its display with the new (null) values, and then resets *db\$mess* to null. The Refresh option refreshes the display with the current values of all ten system variables. This is also achieved by using the Debugger to send itself a message. It simply sets *db\$mess* to "XX". Then at the next null Wimp Poll it spots that the variable has been set, and so displays the states of the ten variables.

ADDING CODE TO THE TEST TASK

The code which you need to add to the task under test is very simple, and is given in listing 3. There are two procedures, and they are called as indicated earlier. Strings sent using PROCdebug are limited in length by the maximum extent of the Debug window, giving a limit of some 40 characters. PROCdebugv formats text and variable in such a way as to limit the length of accompanying text to 14 characters.

Although the Debugger is written in Basic, it can be used for debugging tasks written in any language. Listing 4 gives the equivalent two functions for calling it from a task written in C, where debugging multi-tasking applications is that much more involved. You will see that debugv takes an integer as its third parameter. If you wish to display non-integer values, you will need to cast them to type integer, or to modify the function as appropriate.

Listing 1

```
Set Debug$Dir <Obey$Dir>
IconSprites <Obey$Dir>.!Sprites
WimpSlot -min 16K -max 16K
Run <Obey$Dir>.!RunImage
```

Listing 2

```
10 REM ><Debug$Dir>.!RunImage
20 REM >Debug-2
30 REM Version A 0.02
40 REM Author Lee Calcraft
50 REM RISC User Jan/Feb 1991
60 REM Program Subject to Copyright
70 :
80 DIM block% &200,menu% &100
90 DIM var1% &50, var2% &50
100 DIM name% 100, result% 100
110 DIM disp$(10)
120 ON ERROR PROCerror:END
130 :
140 quit%=FALSE
150 $block%="TASK"
160 SYS "Wimp_Initialise",200,!block%,
"Wimp Debugger" TO version%,task%
170 whandle%=FNcreate(200,200,456,352,
292,0,&FF000002,"Wimp Debug")
180 baricon%=FNicon(-1,0,0,68,68,&3002
,"!Debug")
190 PROCdrawmenu(menu%,"Wimp Debug,Cle
ar,Refresh,Quit")
200 ON ERROR IF FNwimperror THEN END
210 REPEAT
220 PROCpoll
230 UNTIL quit%
240 $block%="TASK"
250 SYS "Wimp_CloseDown",task%,!block%
260 END
270 :
280 DEFPROCpoll
290 SYS "Wimp_Poll",,block% TO reason%
300 CASE reason% OF
310 WHEN 0 :IF FNmessage THEN PRO
Crefresh
320 WHEN 1 :PROCredraw
330 WHEN 2 :SYS "Wimp_OpenWindow"
,,block%
340 WHEN 3 :SYS "Wimp_CloseWindow"
,,block%
350 WHEN 6 :PROCbuttons
360 WHEN 9 :PROCmenuselect
370 WHEN 17,18:IF block%!16=0 THEN q
uit%=TRUE
380 ENDCASE
390 ENDPROC
400 :
410 DEFFNcreate(vwx%,vwy%,vw% ,vwh%,ex
```


A Multi-Tasking Wimp Debugger

```

tx%,exty%,flags%,title%)
420 $block%=STRING$(88,CHR$0)
430 block%!0=vwx%:block%!4=vwy%
440 block%!8=vwx%+vwy%
450 block%!12=vwy%+vwh%
460 block%!24=-1:REM no winds above
470 block%!28=flags%:REM wndow flg
480 block%?32=7:block%?33=2
490 block%?34=7:block%?35=1
500 block%?36=3:block%?37=1
510 block%?38=12:block%!40=0
520 block%!44=-vwh%-exty%
530 block%!48=vwx%+extx%
540 block%!52=0:block%!56=&3D
550 block%!60=3<<12
560 $(block%+72)=title$
570 SYS "Wimp_CreateWindow",,block% TO
handle%
580 =handle%
590 :
600 DEFPROCredraw
610 REM Redraw window
620 handle%=!block%
630 SYS "Wimp_RedrawWindow",,block% TO
more%
640 PROCgetorigin(block%,x0%,y0%)
650 WHILE more%
660 PROCdraw(x0%,y0%)
670 SYS "Wimp_GetRectangle",,block%
TO more%
680 ENDWHILE
690 ENDPROC
700 :
710 DEFPROCgetorigin(block%,RETURN x0%
,RETURN y0%)
720 x0%=block%!4-block%!20
730 y0%=block%!16-block%!24
740 ENDPROC
750 :
760 DEFPROCdraw(x0%,y0%)
770 REM SYS "Wimp_SetColour",11
780 FOR A%=0 TO 9
790 MOVE x0%+16,y0%-32*A%-16
800 PRINT ;A%;":":disp$(A%)
810 NEXT
820 ENDPROC
830 :
840 DEFPROCclose
850 $block%="TASK"
860 SYS "Wimp_CloseDown",task%,!block%
870 ENDPROC
880 :
890 DEFPROCerror
900 ON ERROR OFF
910 $block%="TASK"
920 SYS "Wimp_CloseDown",task%,!block%

930 PRINT REPORT$;" at line ";ERL
940 ENDPROC
950 :
960 DEFFNwimerror
970 !block%=ERR
980 $(block%+4)=REPORT$+" (internal er
ror code "+STR$ERL+")"+CHR$0
990 SYS "Wimp_ReportError",block%,3,"T
est Window" TO ,response%
1000 IF response%=2 THEN PROCclose:=TRU
E ELSE =FALSE
1010 :
1020 DEFFNicon(whandle%,ix%,iy%,iw%,ih%
,flag%,text%)
1030 block%!0=whandle%
1040 block%!4=ix%:block%!8=iy%
1050 block%!12=ix%+iw%
1060 block%!16=iy%+ih%
1070 block%!20=flag%
1080 $(block%+24)=text$
1090 SYS "Wimp_CreateIcon",,block% TO i
handle%
1100 =ihandle%
1110 :
1120 DEFPROCopenwindow(handle%)
1130 block%!0=handle%
1140 SYS "Wimp_GetWindowState",,block%
1150 block%!28=-1:REM open at top of st
ack
1160 SYS "Wimp_OpenWindow",,block%
1170 ENDPROC
1180 :
1190 DEFPROCbuttons
1200 x%=!block%:y%=block%!4
1210 CASE TRUE OF
1220 WHEN block%!12=-2
1230 IF block%!8 AND 2 THEN
1240 PROCshowmenu(menu%,x%,y%,TRU
E,entries%)
1250 ELSE IF block%!8 AND 5 THEN PR
OCopenwindow(whandle%)
1260 ENDIF
1270 ENDCASE
1280 ENDPROC
1290 :
1300 DEFPROCdrawmenu(menu%,menu%)
1310 menu%?12=7:menu%?13=2
1320 menu%?14=7:menu%?15=0
1330 menu%?16=140:menu%?20=44
1340 menu%?24=0:ptr%=menu%+28
1350 $menu%=LEFT$(menu$, INSTR(menu$,"
)-1)
1360 menu$+=", "
1370 entries%=0
1380 WHILE menu$<>" "
1390 menu$=MID$(menu$, INSTR(menu$," "

```

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```

)+1)
1400 IF menu$<>" THEN
1410 !ptr%=0:ptr%!=4--1
1420 ptr%!=47000021
1430 $(ptr%+12)=LEFT$(menu$, INSTR(m
enu$, ", ") -1)
1440 ptr%+=24
1450 entries%+=1
1460 ENDIF
1470 ENDWHILE
1480 ptr%!=24=ptr%!=24 OR &80
1490 ENDPROC
1500 :
1510 DEFPROCshowmenu(menu%, x%, y%, onicon
bar%, entries%)
1520 IF oniconbar% THEN ypos%=96+entrie
s%*44 ELSE ypos%=y%+20
1530 SYS "Wimp_CreateMenu", menu%, x%-64
, ypos%
1540 ENDPROC
1550 :
1560 DEFPROCmenuselect
1570 choice%=!block%
1580 CASE choice% OF
1590 WHEN 0:PROCclear
1600 WHEN 1:PROCrefresh
1610 WHEN 2:quit%=TRUE
1620 ENDCASE
1630 IF NOT quit% THEN
1640 SYS "Wimp_GetPointerInfo", block
%
1650 IF block%!=1 THEN PROCshowmenu(
menu%, x%, y%, TRUE, 3)
1660 ENDIF
1670 ENDPROC
1680 :
1690 DEFFNmessage
1700 received%=FNreadvar("db$mess")<>"
1710 SYS "OS_SetVarVal", "db$mess", ""
1720 =received%
1730 :
1740 DEFPROCrefresh
1750 FOR A%=0 TO 9
1760 disp$(A%)=FNreadvar("db$mess"+ST
R$(A%))
1770 NEXT
1780 !block%=whandle%
1790 SYS "Wimp_GetWindowInfo", block%
1800 xmax%=block%!20+block%!12-block%!4
1810 ymax%=block%!24+block%!8-block%!16
1820 SYS "Wimp_ForceRedraw", whandle%, bl
ock%!20, ymax%, xmax%, block%!24
1830 ENDPROC
1840 :
1850 DEFPROCclear
1860 FOR A%=0 TO 9

```

```

1870 SYS "OS_SetVarVal", "db$mess"+STR
$(A%), ""
1880 NEXT
1890 SYS "OS_SetVarVal", "db$mess", "XX"
1900 ENDPROC
1910 :
1920 DEFFNreadvar($name%)
1930 SYS "XOS_ReadVarVal", name%, result%
, 100,, 3 TO ,, dlen%
1940 result%?(dlen%)=13
1950 =result%

```

```

DEFPROCdebugvv(line%, mess$, var)
mess$=LEFT$(mess$, 14)
var$=STR$(var)
PROCdebug(line%, mess$+STRING$(25-LEN(mess$)
-LEN(var$), " ") + var$)
ENDPROC
:
DEFPROCdebug(line%, mess$)
SYS "OS_SetVarVal", "db$mess", "XX"
SYS "OS_SetVarVal", "db$mess"+STR$(line%), me
ss$
ENDPROC

```

Basic procedures to be included in a program under test

```

#include <string.h>
#include <stdio.h>
#include "os.h"

.
void debugvv(int no, char *var, int val)
{
    char temp[100];
    sprintf(temp, "%-14.14s %10d", var, val);
    debug(no, temp);
}

void debug(int no, char *mess)
{
    char string[20]="db$mess";
    char null[20]="XX";
    int len, R0, R1;
    R0=(int) string;
    R1=(int) null;
    os_sw16(0x24, R0, R1, 0, 0, 0, 0);
    len=strlen(string);
    string[len]=no+48;
    string[len+1]='\0';
    R0=(int) string;
    R1=(int) mess;
    os_sw16(0x24, R0, R1, 0, 0, 0, 0);
}

```

Functions to be included in a C program under test

RU

Archimedes Software



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Add Some Colour to Your Life

David Spencer looks at I-image from Irlam Instruments - the first colour scanner for the Arc.

Only eighteen months ago, the idea of being able to scan a printed image and turn it into a sprite was a novelty for the Arc owner. Then came an influx of monochrome scanners. Now, Irlam Instruments have gone one stage further and launched *I-image*, the first colour scanner for the Arc.

I-image consists of a colour scanner unit manufactured by Sharp (model JX-100), an interface card for the Arc, a separate power supply unit, a disc and a manual. Unlike most monochrome scanners, which use a custom interface to send the image to the computer in a video format, the JX-100 communicates via the standard RS232 serial protocol. You may at this point wonder why an interface card is needed - couldn't the scanner just be plugged into the existing serial port. The answer is no, because while the interface is standard, reading a scanned image involves transferring a considerable amount of data, and to this end the JX-100 uses a very high data rate - up to 115200 baud in fact, much faster than the Arc's serial port can cope with. Incidentally, *I-image* is fully compatible with the A3000 provided an external podule case is used to protect the board, such as those made by Pres Ltd.

The JX-100 is a flatbed scanner that is laid over the image to be scanned. The unit measures 160 by 320mm, and is 40mm in height (weight 1.6kg). Most of the area of the unit is covered by the glass scanning window, which allows images of up to 100mm by 160mm (approximately A6 size) to be read. Rulers marked on the scanning window allow the original to be lined up precisely.

The scanner works by moving a motorised scanning head down over the image. This is done three times, once each

for the red, green and blue components that make up the image. During scanning, which is performed automatically with no user intervention, the image is illuminated by a white fluorescent lamp built into the scanning head. The image is read at a resolution of 200 dots per inch, and each colour is returned as an eight-bit number, giving in theory over sixteen million shades. However, in practice only six bits are guaranteed, reducing the range to a mere quarter of a million shades.

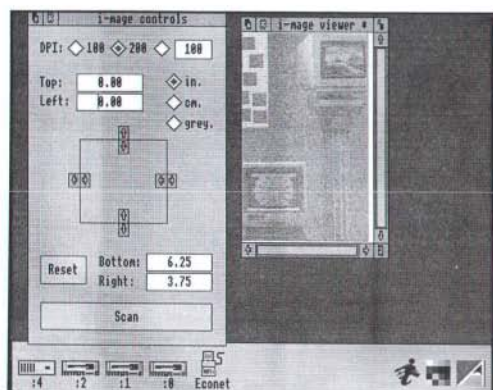


The JX-100 Scanner

The software to drive *I-image* consists of a disc based application called *!!-image*, as well as the low-level drivers built into an EPROM on the interface card. Once installed on the icon bar, clicking on the *!!-image* icon opens two windows - *i-image* controls and *i-image* viewer. The first of these allows the resolution to be set to any value between 50 and 250 dpi (though as mentioned above the image is actually

scanned at 200dpi), the size of the original to be adjusted in terms of left, right, top and bottom margins, and gives the choice between colour and grey modes. Two buttons allow you to reset the defaults, and to start scanning. A visible indication of the margins is given in the viewer window by way of a box showing the area that will be scanned.

While scanning, the image data is written to a file within the *!I-mage* application directory, and this can grow very large - in fact about three megabytes for a full size 200dpi image. Although the manual doesn't quite say as much, *I-mage* really does need a hard disc for scanning large images at high resolution. Having scanned the image, the data is then passed to *Roger Wilson's ChangeFSI* conversion program to produce a mode 21 RISC OS sprite. For more details of this, refer to the article by Roger Wilson in *RISC User* Volume 2 Issue 10.



The *!I-mage* Software

Clicking on the large *Scan* button in the control window starts the scanning operation. It is at this point that you notice the real difference between this and mono scanners. The JX-100 is slow - about ten minutes slow to be precise when scanning the maximum permitted size. During this time, which is so lengthy partly as a result of the speed of the serial interface, and partly because of the need to scan the image three times, the hourglass is displayed on screen, and all

other tasks are suspended - definitely the time for a cup of coffee.

Assuming all goes well, the scanner should whirr as it makes the three passes over the original, and then the image, after being processed by *ChangeFSI* (which takes just a few seconds), is displayed in the viewer window. You can then bring up a menu that allows the viewing size to be changed, the image cleared, or most important of all, the image saved as a sprite, either to disc, or directly to another application, such as a DTP document. Unfortunately, when I tried to scan an image all I got was an error suggesting that there was a communications problem with the scanner, even though the scanner was clearly responding. Eventually, I discovered that this only happened in mode 20, and all worked OK in mode 12. My suspicion was that increased interrupt latency in the higher resolution mode was causing data from the scanner to be lost - a theory that Irlam later confirmed. Apparently, the next version of the software will tackle this problem.

I also found that occasionally, *ChangeFSI* failed with a 'No room for this DIM' error for no apparent reason. However, of much more importance, the quality of the resulting image was very poor, with many colours appearing washed out. As an experiment, I invoked *ChangeFSI* directly from the command line, passing it the data from the scanner (which is stored with the *!I-mage* application), and converting it to a mode 21 sprite using the default options. To my surprise, the result was a near perfect image. I can only conclude therefore that *!I-mage* uses the wrong options when invoking *ChangeFSI*. There were also some other minor errors in the software, such as allowing you to set invalid margins, and the caret appearing in the middle of the control window for no reason.

DOCUMENTATION

The documentation supplied with the review unit was somewhat disjointed. The actual user guide, which consists of

twenty single-sided A5 pages bound with a plastic comb, explains first of all how to fit the interface card to the Arc, and how to connect up the scanner. It then moves on to explain installation and use of the software, including hints and tips and details on transferring images to other applications. Other sections cover the specification of the system and list what you should avoid scanning (basically any original that is wet, or likely to scratch the scanning window).

The user guide is supplemented by a flier from Sharp giving the specification of the JX-100 itself, and a copy of Sharp's JX-100 Operation Manual. This term is rather misleading, as the operation manual is in fact a technical manual, detailing how to control the scanner via its serial port. The use of this information is limited, as the user guide offers no details on how to access the serial port on the interface card directly.

CONCLUSION

To conclude, the JX-100 is an excellent colour scanner - indeed the best when

compared to the alternatives from Epson and Geniscan. Unfortunately, I cannot say the same about the rest of *I-mage* at the moment. As mentioned above, the software failed on a number of occasions, and the user guide provided no help on this. Worst of all, though, is the degradation of otherwise good images by the wrong options being used with *ChangeFSI*. That being said, I feel that all Irlam need to do in order to make *I-mage* a first class product is tidy up the software a bit, and substantially improve the user guide, particularly by providing more help on potential problem areas, and more technical details. Certainly, the quality of images produced when converted correctly is nothing short of amazing, and as for the price: well if you want to be at the forefront of technology you must expect to pay for it.

Product: *I-mage Colour Scanner*
Supplier: Irlam Instruments Ltd.
133 London Road,
Staines,
Middlesex TW18 4HN.
Tel. (0784) 451192
Price: £688.85 Inc. VAT

RU

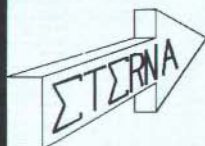
GAME'S PROGRAMMER READ THIS

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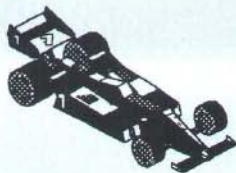


RISC OS Euclid is the best multi-tasking 3D graphics and animation system for the Archimedes. It works like a 3D version of Draw, and now forms the centrepiece for a number of related products allowing the creation of complex animation sequences with the minimum of effort.



Mogul makes full use of **Euclid's** unique hierarchical data structure to generate films of 3D objects with articulated motion and simultaneous camera motion.

Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by



calculating intermediate frames from a set of key positions.

Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

Support is provided for import and export of Sprites and Drawfiles. Films can be played by the **Projector** which comes free with **Euclid, Mogul, Splice and Tween**. Films and Euclid files can be used with Genesis.



Such is the enthusiasm for **Euclid** there is now a user group called **Elements** which provides a quarterly disk containing hints, tips, animations and user pictures like the ones in this advertisement.

Euclid £70 **Mogul** £20 **Splice** £30
Tween £30 **ArcLight** £50
Ace Computing, 27 Victoria Road,
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All prices include VAT and P&P.



Ace Computing

WP/DTP: Using Ovation

Public relations consultant Roger Amos, who uses Ovation to prepare newsletters and user manuals for his clients, passes on a few useful hints and tips.

The problem with Ovation is that it is so simple - even intuitive - to use that it is easy to fall into sloppy habits. Some of its most useful features are not immediately obvious and, unless you take the trouble to read the User Manual thoroughly from cover to cover, you may not realise that they are there. And even if you do know they are there, you may not be aware of the ways in which they can be used. This article will attempt to highlight a few of these.

PAGE LAYOUTS

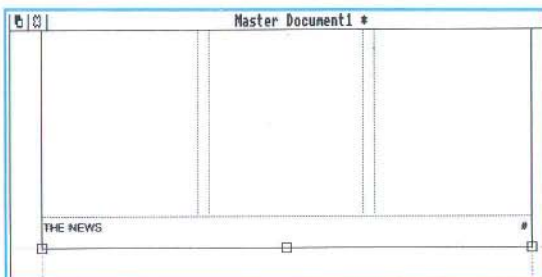
For instance, in Ovation you can start up the application and begin typing without further ado. Since the *Principal Text Frame* is present on every page, and there is a default paragraph style, *Bodytext*, you can use Ovation as though it were a word processor. Indeed I frequently do use it in that way when I wish to write a letter. This stands in contrast with some other DTP packages in which you must define a text frame and paragraph style before you can type so much as one character into your document.

But therein lies the danger. Come the day when you want to create three-column pages for a magazine, you may find yourself arduously drawing three linked text frames and struggling with rulers to get the three columns evenly spaced and exactly level with each other. And all the while Ovation will do it for you effortlessly and with perfect precision!

The *New Document* dialogue box (obtained by clicking Menu on the Ovation icon) allows you to enter your choice of page size, margin widths, header and footer areas, number of columns and column separation. It then calculates the column widths from what remains. The page is set up with the *Principal Text Frame* tailored to your requirements. If you specify "double sided", you will be

given separate left and right page layouts, ideal for magazine production.

If there are items that need to appear on every page such as lines, headers, footers or logos, you can insert these on the *Master Pages*. They will then be reproduced on each page of the document. Having specified your basic layout requirements on the *New Document* dialogue box, press Return or click on OK. You will now see your first page which will of course be blank apart from the guidelines. On the Page menu select *Show Master Pages*.



Part of the Master page for a three-column document. Note the footer area with page number represented by a hash sign (#) in the right hand corner

You can treat the *Master Pages* exactly like normal pages except that you cannot type text directly into the *Principal Text Frame*. You can add lines, text frames or picture frames anywhere. You can type text directly into the header and footer areas. Use a right-hand Tab stop to align items flush with the right-hand margin. Remember too that you can insert the page number by simply pressing Insert. On the *Master Pages* the page number will be represented by a hash sign (#), but on the pages themselves this will be replaced by the current page number. Moreover, the page number will be updated automatically. If you subsequently insert or delete pages each page number will be faithfully corrected.

Some confusion arises as to how changing the *Master Pages* affects pages in the document that already exist. It is

very simple. Anything typed directly into the header or footer areas will be retrospectively applied to all existing pages in the document - and also of course to all new pages added to the document. But any new objects introduced into the Master Pages, such as lines, text frames or picture frames, will only appear on new pages added to the document.

PARAGRAPH STYLES

Ovation allows you to define an almost unlimited number of paragraph styles. Why, you may ask, should anyone need so many? Surely a paragraph is just a paragraph? Won't one or two paragraph styles suffice in a normal document?

The answer is that to Ovation a paragraph is any string of text between Return characters. It may be a traditional multi-line paragraph (like this one), but it may also be a heading (like the "PARAGRAPH STYLES" heading a few lines back). So you can define a paragraph style for use as a heading. And you may need several grades of heading, some perhaps using bold type and some using italic. Figure captions provide another potential paragraph style. There are dozens of uses for paragraph styles quite apart from paragraphs in the strict grammatical sense.

GRAPHICS

Ovation may seem to be a little lacking in its graphics capabilities. But every RISC OS user also has the Acorn Draw and Paint applications. Draw, in particular, is remarkably versatile. Any graphics that you create with either of these can be imported directly into an Ovation picture frame. Even Draw files containing "text area objects" can be used, and subsequently rescaled if necessary. If you have a 1 Mbyte computer, be careful about importing sprites from Paint, because they can use up a lot of precious memory space, especially if created in a high-resolution multi-colour screen mode.

SPECIAL EFFECTS

Sooner or later you will find yourself wanting to create some special effect which at first thought seems to be impossible. I have not yet discovered any effect that really is impossible, but some need to be thought out carefully and some may need the help of additional software.

An example is vertical text. The best software for this purpose is FontFX (available from BEEBUG) which converts short text strings in the outline fonts into Draw-style path objects. These can be rotated, re-sized, mirrored and reversed ad infinitum and then imported into an Ovation picture frame.

General Enquiries	Mary Jones	ext 112
Technical Sales	John Brown	ext 117
General Sales	Tim London	ext 119
Accounts	Jack Williams	ext 121
	Joan White	ext 116

Figure 2a

General Enquiries	Mary Jones
Technical Sales	John Brown
General Sales	Tim London
Accounts	Jack Williams
	Joan White

Figure 2b

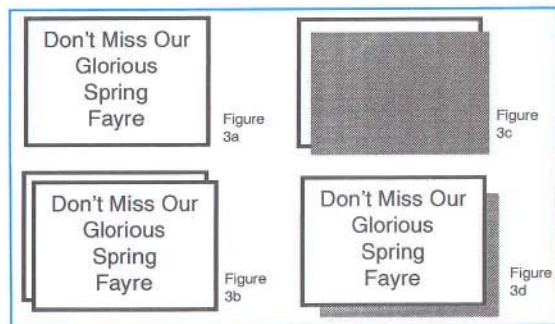
Using transparent text frames for creating different lay-out effects

Another common requirement which can seem baffling is a curly bracket that embraces several lines of text, as shown in Figure 2a, which is part of a company brochure. The wording *General Sales* also poses a problem since it is spaced half-way between the regular lines. The solution to these and many other layout problems is to use transparent Text Frames, as Figure 2b shows. The wording *General Sales* was omitted from the original "story" and inserted in a transparent Text Frame of its own. Since the frame is transparent, it does not repel the text beneath or affect it in any way. The bracket was inserted in precisely the same way, using a larger type size. The transparent frames can be carefully moved to any required position. Any text or picture frame can be made transparent by clicking in the *Transparent* icon in the Modify Frame dialogue box.

One particular effect which is currently very popular in periodicals is the drop shadow. This is quite easy to create in Ovation using the *Duplicate Frame* facility in the Object menu. First create a frame to hold your text (or whatever);

compose your frame contents and give your frame a thin border (*Frame Border* option in the Object Menu). The result should look more or less like Figure 3a.

Now use the Duplicate Frame facility to create a copy of the frame (including text). This will probably be created overlaying the original, but that does not matter (see Figure 3b).



Creating a drop-shadow box

Now turn the duplicate into a shadow by changing its background colour to black (or grey or whatever colour you prefer). You may need to remove the border (by giving it a width of 0) and to delete the text or other contents (see Figure 3c).

Lastly, carefully position the shadow frame and then use the *Send Behind* option in the Object Menu to send it behind the original, creating the illusion that the original is "floating in space" (see Figure 3d).

PRINTING

Before you print your document do use the *Show Printer Margin* option on the View Menu. This will enclose the area to be printed with a grey margin (assuming that the printer driver has been loaded). Any item that is in the grey margin will not be printed. It is important to check this as the page areas handled by different types of printer vary widely. If you find that part of your page is outside the printable area, you can use the *Printer Setup* dialogue box (on the File menu) to move the printable area. You may also be able to drag the page contents if all objects are inside the Principal Text Frame.

If you use a 1 Mbyte machine, you may find that printing is a tediously slow process, unless you are using the PostScript driver. This is because most of the printer drivers need a large expanse of memory as workspace. The driver prints Ovation pages effectively by screen dumping, but the screen that is dumped is not the monitor display, which has far too coarse a resolution, but a "virtual image"

of the page created at a higher resolution selected by the printer driver. Since an A4 page at 300 dots per inch would require nearly 1 Mbyte, there is not sufficient memory here to hold an image of the whole page. So the printer driver will use whatever memory is available and will divide the page into sections that will fit into the available memory.

For each section, every object on the page must be examined and, if its boundary overlaps that of the section being printed, it must be plotted on the virtual screen. It is this that takes the time. Clearly the greater the memory that can be made available to the printer driver, the fewer such sections will be needed and the faster the page will be printed.

SPEEDING UP THE PROCESS

If you haven't already learned the following tricks, you should find that they accelerate printing considerably. Having selected your required printer resolution, delete the printer driver icon from the icon bar. This will clear a valuable 64 Kbytes of memory for the printer. The module which actually drives the printer will remain in memory. Secondly, change to screen mode 0. To do this you will need to use the last "writeable" item in the Mode menu on the palette icon. The screen display will look awful, but the print quality will not be affected. And changing to mode 0 from mode 12 will save you another 56 Kbytes.

Ovation has revolutionised some aspects of my day-to-day work. The ability to save PostScript files and transfer them to an MS-DOS disc which can be sent to a printer for typesetting on a Linotron high resolution typesetter is providing my clients with professional quality print in a convenient and modestly priced service.

RU

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ArcLight

Mark Sealey looks at the new ray-tracing package from Ace Computing.

ArcLight is a very reasonably priced ray-tracing package from the same stable as the successful Euclid and associated 3D-image manipulation packages. Ray tracing (rendering) is a graphics technique which produces very realistic 3D images on screen. They are particularly lifelike because every single pixel which makes up the surfaces, shadows, highlights and reflections of the scene is calculated individually in a way that takes account mathematically of how all possible rays of light would actually fall on it.

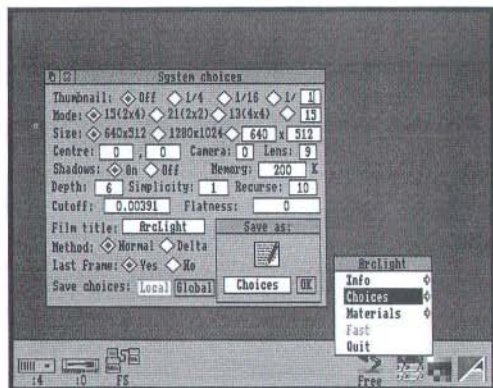
Because of this high processing overhead, ray tracing is usually slow - even on 32 bit machines. There have been at least two commercial packages to tackle ray tracing: Clares *Render Bender* and Silicon Vision's *Solids Render*, both available for some time. There are also public domain and shareware ray tracers. ArcLight approaches things from a slightly different angle. It differs from other packages in that it takes Euclid files as its raw material. Euclid is Ace's own 3D equivalent of Draw and is at the centre of Ace's range of image-manipulation products.

But ArcLight does more: from a series of single ray traces, it can also produce (compressed) animated rendered sequences, using Lempel-Ziv compression. These can then be viewed without the need to have ArcLight itself installed, by using Ace's PD application *Projector*. It also does this quickly, taking minutes rather than hours, though benchmarks are not very helpful since the complexity of the original picture may vary a lot. ArcLight is also simpler to understand and use, and cheaper than its potential rivals.

USING ARCLIGHT

Once the application is installed, using it is delightfully straightforward. You can ray trace a single Euclid image by dropping it onto the ArcLight icon, or you can

produce an animated film in its entirety. In this case, you drop a directory which must contain a valid Euclid image called *Picture*, or a Mogul file called *Sequence*, onto the ArcLight icon. Ace provides some sample directories on the disc, e.g. *glass*, *lamp* and *mirror*. Dragging one of these to the ArcLight icon will start the process of generating an animated raytrace. The disc also contains one finished film, and pretty impressive it is too.



ArcLight's comprehensive options dialog box

Before ray tracing actually begins, you can set various parameters which affect how the trace proceeds. There are some fifteen of these, and sensible defaults are provided in each case. The slim but adequate manual explains the ins and outs of each, though some prior knowledge of the principles of ray tracing - especially the algorithms behind it - would be an advantage.

Once rendering has begun, it can be interrupted at any time by clicking Menu over the picture window in which the image is being traced line by line (this is a proper Wimp window and occupies about a quarter of the screen). A Sprite of about 40K results. You then have the choice of aborting, suspending or pausing once the

down the statistics, such as the time taken, as an aid to planning the next frame. Indeed, a statistics window is also an option at this stage. This shows such details as the current pixel position, the number of rays and ray hits and the instances of various tests carried out during computation. Usefully, there is a count of elapsed and drawing time. All of this is updated in real time.



A ray-traced picture produced by ArcLight

In other words, ArcLight not only multi-tasks with other applications, but with itself. This means that two or more images could be worked on simultaneously. When you bear in mind that ArcLight is significantly faster than its rivals, this is not as perverse as it sounds.

TECHNICAL DETAILS

The full technicalities of render geometry are outside the scope of this review, but the most important parameters control the size and screen mode (256 colour only) of the image produced (1/4, 1/16 of the screen etc), camera position, compaction, recursion and cutoff numbers as well as simplicity and depth.

You have full control over each of the 15 surface materials allowable. This affects the texture and the way that a highly polished surface, for instance, will exhibit different optical characteristics from matt paper. The release notes are

particularly forthcoming on these aspects. It is useful, too, to have the option of globally as well as selectively saving such parameters in a text file, and equally useful to know which defaults ArcLight uses. There is plenty of scope for informed experiment here.

CONCLUSIONS

ArcLight is simpler to use than the competition. Because it is truly Desktop compatible, the three main menus are completely context sensitive, which makes the package easier to learn. What is more, you are likely to have some familiarity with Euclid and the world of 3D imaging; this means that you will probably know your way around the use of objects, surfaces, cameras and angles, which are the currency of this sort of work.

ArcLight allows option setting in the most natural way, using standard RISC OS dialogue boxes. This contrasts with Render Bender, for example, which uses a script language to produce the original images and then light and position them.

ArcLight also appears to be the fastest of the three packages mentioned. Typical timing for a 2-3K Euclid file is just a few minutes, and for this reason it deserves serious consideration, particularly since it is also the cheapest. If you already use Euclid, ArcLight is the natural choice. If not, then you will need to have access to Euclid files to use ArcLight. However, since Euclid is now a well-established product, ArcLight will probably emerge a clear winner.

Product	ArcLight
Supplier	Ace Computing 27 Victoria Road, Cambridge CB4 3BW. Tel. (0223) 322559.
Price	£50.00 inc. VAT.

The latest version of Projector is included on this month's magazine disc, together with an animation produced by ArcLight.

RU

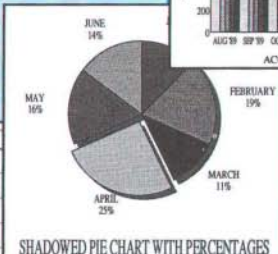
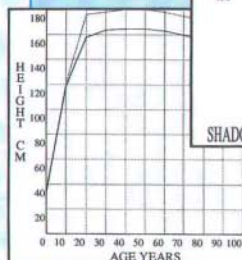
RISC User Desktop Applications 1

A disc containing a selection of some of the best multi-tasking desktop applications.

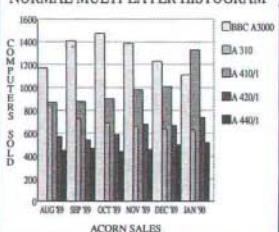
Two new stand-alone applications have been specially written for the disc - a data presentation package **!DataSheet** (similar programs are sold commercially for about £50) and a multi-format print utility **!Print**, which has been developed in-house.

!DataSheet

Data Presentation Package -
A very impressive application that allows you to create graphs in a variety of formats for display on-screen or printing. Once created, graphs can be re-sized and positioned in the display window, and the data can be edited.



NORMAL MULTI-LAYER HISTOGRAM



!Diary

Desktop Diary -
A multi-tasking diary and calendar that lets you keep track of your appointments, or simply keep track of what day it is.

!B to T

Desktop Application Handler -
A useful utility which converts Basic programs to text files and vice-versa, allowing programs to be edited without leaving the Desktop.

!FileFind

File-find utility -
A utility that can search a directory hierarchy for a given file, directory, or application. This utility is fully compatible with floppy and hard discs, as well as with Econet.

!SetType

Filetype Setter -
A handy utility that allows you to change the filetype of any file by dragging it to the icon bar.

!HotKeys

A Desktop hotkeys utility that
allows single key presses to perform a wide range of functions, such as opening directory viewers, starting applications or saving screens.

!Mouse

Mouse-speed Controller -
A utility which allows the user to change the mouse speed merely by clicking on an icon. This can be particularly useful when a large degree of precision is required, without slowing down the mouse all the time.

!Print

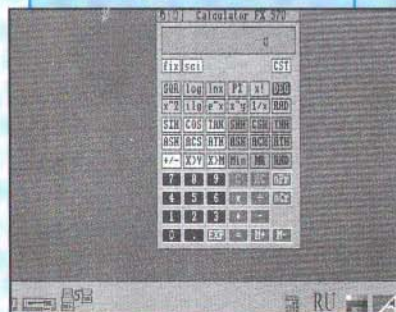
Multi-format Print Utility -
A utility that allows text files, Basic program listings and Sprites to be printed by dragging them to the icon bar.

!NotePad

A Desktop Notepad application
which allows up to eight pages of notes to be jotted down. The contents of the notepad can be saved for later reference, or printed out.

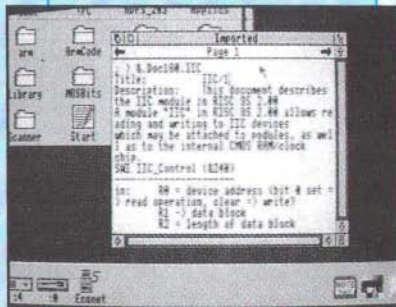
!Calc 570

Scientific Calculator -
A Desktop implementation of the Casio FX570 scientific calculator. It includes all the usual functions such as Sin, Cos, Log, Ln etc.



!CharDes

Character Designer -
This application lets you define new system fonts.



!Dustbin

Desktop Dustbin - A useful utility
which allows files to be deleted simply by dragging them to the bin on the icon bar. Accidentally deleted files can be recovered by opening the bin and dragging them out, while multiple files can be deleted by selecting and dragging them together.

The RISC User Desktop Applications disc is available for **£9.95** to members Stock Code **PDA1**

Please add p&p (60p for UK, £1 for Europe and £2 for elsewhere).

BEEBUG Ltd, 117 Hatfield Road, St Albans, Herts AL1 4JS. Telephone (0727) 40303 Fax (0727) 860263

Making the Most of Your Multi-Sync Monitor

David Spencer and Martin Thorpe describe a number of items of interest to multi-sync monitor owners.

The use of multi-sync monitors with the Arc is becoming ever more popular, though there is still a lot of mystery surrounding them, some of which we will look at in this article. We will kick off by looking at what seems to be the latest craze in hardware add-ons - the VIDC Enhancer. To understand what this little beast does, we need to go back to basics and look at how the Archimedes video controller chip (VIDC) generates a display.

USING A VIDC ENHANCER

VIDC uses a master clock input to determine the timing of the whole display. A combination of the speed of this clock and the number of pixels per line (not only those displayed, but also invisible pixels making up the border and margin) determines the period of time between line-sync pulses. This period must be fixed at 64ms on a standard monitor, but can be varied over a wide range with a multi-sync device. Similarly, the line-sync rate and the number of lines making up the display determine the rate at which the entire screen is refreshed. This rate must be about 48Hz at least, otherwise flicker will become noticeable.

Clearly, with a fixed clock rate to VIDC, any increase in the screen resolution, either vertically or horizontally will reduce the refresh rate, because there will be more pixels to be displayed, and as the rate at which they are displayed has not changed, the time required to display them must. This means that at high resolutions flicker becomes noticeable. The addition of a VIDC Enhancer increases the maximum VIDC clock speed from 24MHz to 36MHz. This means that higher resolutions are possible before flicker becomes a problem, and conversely, if the resolution is unchanged, a VIDC Enhancer will increase the refresh rate giving an overall steadier display.

Physically, a VIDC Enhancer is a tiny circuit board that plugs onto a collection of links within the Archimedes usually reserved for use with a Genlock card. A further flying lead connects to the 5V power line (usually via a spade connector on to the backplane), and there is also some form of connection to allow the device to be controlled, more of which later.

There are currently two VIDC Enhancers available. The first is made by Atomwide, and has the option of either manual control via a rear-panel switch, or software control. The other device is produced by Beebug, and only features software control, through an internal I/O port. This makes the Beebug device a dealer fit only upgrade, although the fact that the VIDC Enhancer can be enabled and disabled from software means that it can be turned on and off automatically depending on the mode in use. Both units come with new modes modules for the Taxan 795 and Eizo 9070, and the Beebug device also has a Riscware mode definer, which allows a collection of modes to be defined and edited, and then saved together in a single module. More details of both units can be found in the current Beebug Retail Catalogue, and the Hardware and Software catalogue sent with last month's issue of RISC User.

SETTING UP THE TAXAN 770 AND 775

Our second item comes from Martin Thorpe and explains how to adjust the Taxan 770 and 775 monitors for best results. Setting up the newer Taxan 795 is different, and will be covered in a future article.

The first point to note about setting up any monitor is that it must be in its normal working state before making any adjustments. This basically means that the computer and monitor should be

turned on for about an hour first. Having done this, the monitor can be set up as follows:

Set the three rear controls on the monitor to their centre 'click' positions, set the *Colour Mode* switch to auto, the *Phase* switch to off, and the *Preset* switch to auto.

Select mode 12, and from Basic issue the command CIRCLE 640,512,511. Using the plastic trimming tool supplied with the monitor, adjust row A of the presets on the rear of the monitor so that the circle appears circular, and fills the screen as fully as possible. The four presets allow you to control the height, width and horizontal and vertical position.

Select mode 20 (ensuring the monitor type has been configured to 1), issue the circle command again, and adjust row B of the presets to achieve the same results.

Issue the command *CONFIGURE MON.3, select mode 20 (which in fact will select the nearest VGA equivalent), type CIRCLE 640,480,479, and adjust row D of controls this time. Note that on a 770 (but not a 775) you may be unable to set the width correctly for VGA modes.

Reconfigure the monitor type to 1, and if you are using the new modes module described below, select mode 120 and issue the command CIRCLE 800,600,599. Set the Preset switch to release, and adjust row C of the presets to give the correct picture. Finally, don't forget to put the Preset switch back to auto for using standard modes.

With a little patience, the above procedure can result in excellent quality images from the 770 and 775, although you may find, particularly with the 775, that in order to get an undistorted picture, you have to reduce the picture size considerably.

NEW SCREEN MODES

Next, also from Martin Thorpe, we describe a number of new modes

particularly suitable for the Taxan 775. These were defined using an improved version of the mode definer program published on the disc accompanying RISC User Volume 3 Issue 4. Martin has modified the program to make it more effective when defining multi-sync modes. The new version of the program is supplied, together with the new mode modules described below, on this month's magazine disc.

The new modes available are:

Mode 112 - 800 by 600 pixels, 16 colours.

Mode 118 - 800 by 600 pixels, 2 colours.

Mode 119 - 800 by 600 pixels, 4 colours.

Mode 120 - 800 by 600 pixels, 16 colours.

Modes 112 and 120 differ as the former is designed to give 75 lines of text in the Desktop, while the latter gives 35 double-height lines, in a similar manner to mode 20.

You may find that these modes flicker too much for comfort, depending very much on your personal 'flicker' threshold which varies from person to person. Obviously, with a VIDC Enhancer fitted this flickering can be alleviated.

NO SUN FOR YOUR MONITOR

To round off this article, a warning about care of your monitor. Always avoid exposing the screen to direct sunlight for a long period of time - something which is a particular problem at this time of the year when the sun is low in the sky. The problem is that sunlight has an adverse effect on the phosphors inside the monitor tube, and prolonged exposure desensitises them. This results in loss of brightness, contrast and colour, and while the loss is reversible, it can take several days for the phosphors to recover fully.

This month's magazine disc contains the improved mode definer, and the four new mode modules.

RU

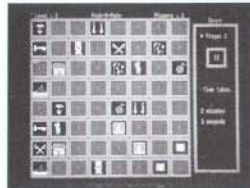
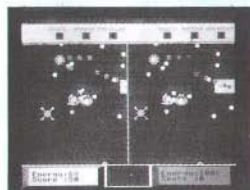
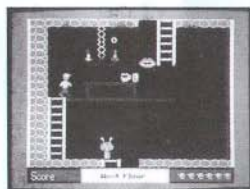
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Scrolling Stars

This program by Ben Moseley demonstrates the use of three-dimensional scrolling techniques on the screen.

StarScroll is a short ARM code routine which scrolls a number of stars across the screen at different speeds, to create an impression of depth. The routine pokes to screen memory for maximum speed.

Type in the listing carefully and save it as *StarScroll*. When run, the code is assembled and then executed. The screen will clear, and you will see the stars scrolling across from left to right, with a range of different speeds. Pressing any key will exit from the routine.

PROGRAM DESCRIPTION

PROCinit defines the number of stars (held in no% at line 160). You may alter this if you wish, but as this value is also used as an immediate constant in the assembler code, there are restrictions on the value you may choose. You can select any number below 256, any number divisible by 4 between 256 and 1024, or any number divisible by 16 over 1024. However, 1024 is a sensible upper limit since the screen starts to flicker if too many stars have to be plotted. A memory block is also set up in PROCinit to hold three random numbers for each star: its vertical and horizontal starting positions and its type, which determines its speed (between 1 and 4).

The ARM code first calls SWI "OS_ReadVduVariables" to find the address of screen memory, and uses this to poke values directly to the screen. Then the routines *display* and *move* are repeatedly called until a key is pressed. *display* plots the position of each star, and writes a byte to the screen memory. The value of this byte depends on the star type, and its bits determine which pixels are displayed, and in which colour. These values (255, 252, 208 and 47 in lines 480-

510) can be altered to change the size and colour of the star. *move* then adds an offset to the horizontal position of each star as held in the memory block; the higher the type, the greater the offset, and thus the further the star will have travelled on the next display cycle.

Routines such as this are often used in games to produce smooth 3-D scrolling effects, and it should not be difficult to incorporate a similar routine into your own programs.

```
10 REM                >!RunImage
20 REM                Scrolling Stars
30 REM Version        A1.00
40 REM Author         Ben Moseley
50 REM RISC User      January 1990
60 REM Program        subject to copyright
70 :
80 MODE 13
90 OFF:PROCinit
100 PROCass:CLS
110 !saddr=stars
120 CALL init
130 ON:END
140 :
150 DEFPROCinit
160 no%=300
170 DIM stars (no%*12)
180 FOR cnt%=0 TO no%-1
190 stars!(cnt%*12)=RND(319)
200 stars!(cnt%*12+4)=RND(254)
210 stars!(cnt%*12+8)=RND(4)
220 NEXT
230 ENDPROC
240 :
250 DEFPROCass
260 cnt=3:strs=4:no=5:type=6:x=7:y=8
270 off=9:inc=10:screen_start=11
280 link=14:pc=15
290 DIM code 1024
300 FOR pass%=0 TO 3 STEP 3
310 P%=code
```

```

320 [OPT pass%
330 .move
340 MOV cnt,no:MOV off,#0
350 .movloop
360 LDR x,[strs,off]:ADD off,off,#8
370 LDR inc,[strs,off]:ADD x,x,inc
380 SUB off,off,#8:CMP x,#320
390 SUBGT x,x,#320:STR x,[strs,off]
400 ADD off,off,#12:SUBS cnt,cnt,#1
410 BNE movloop:MOV pc,link
420 .display
430 MOV cnt,no:MOV off,strs
440 .displloop
450 LDR R1,[strs],#4:LDR R2,[strs],#4
460 LDR type,[strs],#4:MOV inc,#320
470 MLA R0,inc,R2,R1
480 CMP type,#4:MOVEQ inc,#255
490 CMP type,#3:MOVEQ inc,#252
500 CMP type,#2:MOVEQ inc,#208
510 CMP type,#1:MOVEQ inc,#47
520 ADD R0,R0,screen_start
530 STRB inc,[R0]:SUBS cnt,cnt,#1
540 BNE displloop
550 MOV str,off:MOV pc,link

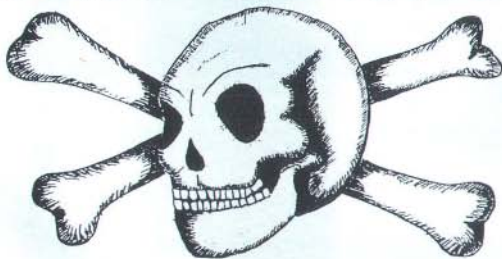
560 :
570 .animate
580 BL display:BL move
590 MOV R0,#121:MOV R1,#0
600 SWI "OS_Byte"
610 CMP R1,#&FF:LDMNEFD R13!,{pc}
620 MOV R0,#19:SWI "OS_Byte"
630 SWI &100+12:B animate
640 :
650 .init
660 STMFD R13!,{R14}
670 ADR R0,in:ADR R1,out
680 SWI "OS_ReadVduVariables"
690 LDR screen_start,[R1]
700 MOV no,#no%:ADR R0,saddr
710 LDR str,[R0]:B animate
720 .in
730 EQU 148:EQU -1
740 .out
750 EQU 0
760 .saddr
770 EQU 0
780 ]
790 NEXT:ENDPROC

```

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Pirate Software

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Say It With DT-Talk

by Lee Calcraft

DT-Talk is a modestly priced piece of software which will give your Archimedes the power of speech. For around £15 plus VAT you get a disc and a neat little manual consisting of 16 A6 pages. As the manual says, DT-Talk is easily installed. Just double-click on the (somewhat unimaginative) icon in the directory viewer. This installs two relocatable modules, and then tells you (verbally) that installation is complete. This gives you just one star command, plus two SWI calls for low-level access to the system.

The star command is `*SAY` - reminiscent of the old BBC micro program `!Speech`. If you type:

`*SAY Hullo`

it will say "Hullo". To incorporate speech into your own programs, you need to use `*SAY` bundled up into an `OSCLI` statement. For example:

`talk$="How are you"`

`OSCLI("SAY "+talk$)`

The speech is reasonably clear, and uses an English accent, though it does have the familiar synthesiser twang to it. However, this is an allophone based synthesiser, and rates well against other comparable efforts.

By "allophone-based" it is meant that each word which the device utters is first broken down into component phonemes, and their corresponding allophones. The sequence of allophones is then vocalised to produce the final result. The two processes are quite separate, and each has its own relocatable module. Deciding exactly what sequence of allophones to use for the particular group of letters making up a given word is a virtually impossible task, especially in English where spelling is very far from phonetic. Nevertheless, DT-Talk appears to take on this task with intelligence.

Even so, you will often find that by spelling words more phonetically you can produce much clearer speech. For example, if you enter:

`*SAY Archimedes`

you will get a recognisable output, but the word will sound more like:

`Archer-meads`

To sober up the talker, use the more phonetic:

`*SAY Arkimedeeds`

Sometimes the rendering fails completely, as with:

`*SAY know`

which comes out like the "co" of "cooperate". The easy fix is to use:

`*SAY no`

and sometimes adding a space within a word changes the way in which it is pronounced quite radically, and to good effect. For example:

`*SAY No vember`

gives a much better rendition of November than without the space.

As a bonus, DT-Talk also contains an additional icon bar application which speaks the contents of any text file dragged to its icon. This is a nice idea, but it is sometimes rather difficult to follow what is being said, for the reasons suggested above, unless the words have been specially chosen, or better still, phoneticised to some degree.

In conclusion, DT-Talk offers excellent value for money, providing the Arc with its first vocal chords. However, even though this product was only launched a matter of weeks ago, its author D.T. Knell (hence DT-Talk) has plans for a much more ambitious synthesiser. It is claimed that this will give near speech quality output, and will use more sophisticated techniques for translating English text into its component allophones. It is expected to be a number of months before this new product is released, when it will sell for around twice the price of DT-Talk: an upgrade option will be available.

Product	DT-Talk
Supplier	Atomwide
	23 The Greenway,
	Orpington, Kent BR5 2AY.
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Price	£17.19 inc. VAT

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Ideas Processor

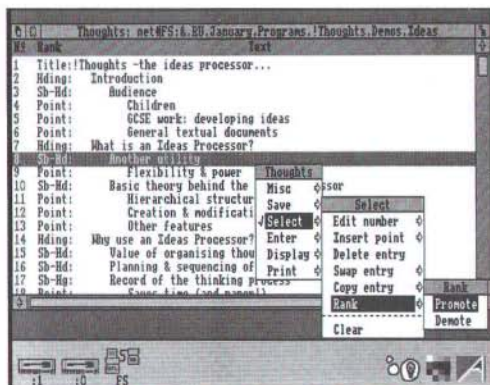
Gather your thoughts with this application from Gareth Rampton.

The program is supplied on this month's magazine disc only.

Thoughts is an application designed as an aid to planning a letter, project, or any other textual document which may need a structured plan before putting printer pins to paper. You could also use it to plan a talk or lecture. The application allows you to order your thoughts into a hierarchical structure using the following categories:

- Title
- Heading
- Sub-heading
- Point

Text can be manipulated freely between these categories, and then edited. The resulting ideas structure can then be printed and used as an aid in the creation of a document.



The Ideas processor in action

Why bother, you might ask. Well, an ideas processor can actually save valuable time by reducing the need for drafting and editing, and can help to produce a much clearer end document.

Double-clicking on the application's icon in a directory viewer installs the application on the icon bar. Clicking Menu over the icon bar icon produces the usual

Info and Quit options, plus Help which gives you on-screen help. Clicking Select or Adjust on the icon will produce the main ideas window, where all your ideas will be shown.

CREATING IDEAS

To create a new set of ideas click Menu in the ideas window. From the resulting menu, select *Title*, *Heading*, *Sub-heading* or *Point*, enter the text and press Return or click on the menu entry to display the idea.

You can edit any item by highlighting it and then selecting one of the following options: *Insert*, *Delete*, *Copy*, *Swap*, *Promote* or *Demote*. These options are largely self-explanatory, but full details on how to use them, and all the other facilities of the program, are contained within the Help file inside the application.

PRINTING AND FILING

You may print out your ideas, or a selection of them, from within Thoughts by choosing the *Print* option. The application does not use the RISC OS drivers, but prints directly. You can also load and save data in the same way as with other RISC OS applications. It is also possible to save the text as an ASCII file suitable for loading into Edit, or into a word processor or DTP package.

CONFIGURING SETTINGS

Within the application directory is a file named *Config*. This file contains configured options for the printer and for screen colours. New values may be substituted for those shown, as needed.

EXAMPLES AND DEMOS

The application also contains a sub-directory called *Demos*, with two files which demonstrate what Thoughts can do. One is an example Thoughts file, and the other is a text file created from the application.

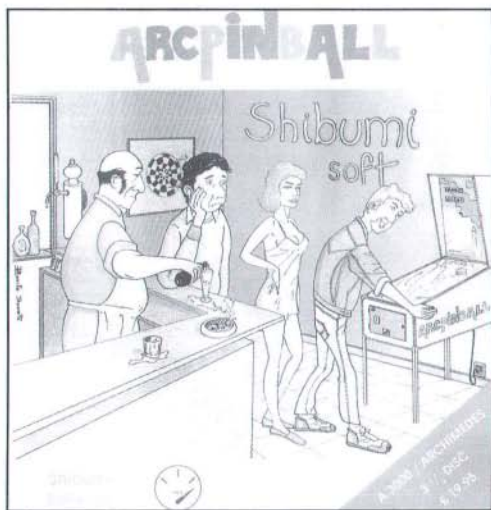
RU

A round-up of the latest games releases for the Arc & A3000 by Peter Rochford

A part from a few excellent sound and graphics demos from the infamous Brothers-In-ARM team in Norway, we don't often come across much in the way of software from Arc users on the continent, of which there are incidentally, quite a fair number. Last month we did review *Ballerena*, a breakout-type game from France. Now there is another offering from across the Channel in the shape of *Arcpinball*.

ARCPINBALL

Arcpinball (£19.95) from Shibumisoft, is a computer simulation of the pinball arcade machines so popular in the sixties and seventies and still around today. This reviewer remembers them with great affection but will not bore you here with his tales of a misspent youth!



Arcpinball

Right from the opening screen of this game, you get the feeling that this is going to be something different. It certainly is. Like *Ballerena*, this is a game that features some rather zany sound and graphics.

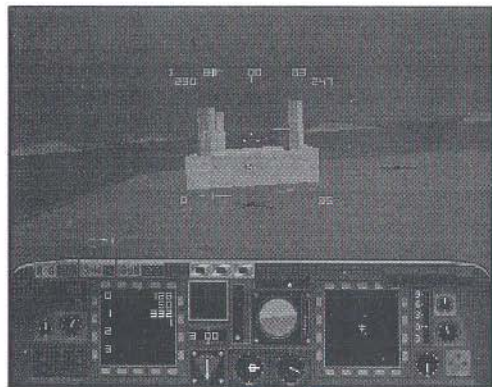
After the opening shot of the front of the pinball machine complete with coin being dropped into the slot, you are presented with a view of a pin table from above. It's all there, bumpers, lights, flippers etc., and the ball sitting on the spring launcher waiting to start. Hold down the space bar and watch the spring being drawn back, release and then off goes the ball, hurtling round the screen with amazing speed and realism. From then on it's all down to concentration and reflexes, just like the real thing. You can't take your eyes off the screen for a moment as your fingers almost involuntarily tap away at the Shift keys controlling the flippers.

There are plenty of weird sound effects and snatches of tunes to add to the fun of the game, and to the right of the screen a small TV screen shows short film clips. Strange!

The graphics are different, but nonetheless excellent, as is the sound. Gameplay is tough and you really do have to work hard to keep the ball in play. But this is truly a fun sort of game, and I am totally addicted to it. Perhaps that could be put down to nostalgia, but I have played this sort of simulation on other computers and none comes anywhere near this in terms of feeling like the real thing. If you fancy something really out of the ordinary, *Arcpinball* will not disappoint.

INTERDICTOR II

Many moons ago, we reviewed Clares' *Interdictor* flight simulator, a package that has been well received and continues to be a favourite amongst Arc users. Now we have *Interdictor II* (£33.20), an updated and much enhanced version of the original. I will not give a full description of the whole package here, just a brief rundown on the new features and improvements.



Interdictor II

The new game has a much larger map area than the old one, with lots more targets to choose from. A 'flying brick' mode has been added for those like me who are a bit dodgy at the controls. Basically, this lets you fly the plane without fear of crashing as the thing just bounces off the ground and back up again. It also gives you an unlimited supply of ammunition too!

One major criticism of the original was lack of ground detail. This has been put to rights with *Interdictor II*, with plenty of new scenery for you to admire as you whizz along. This includes a railway with a train running up and down it, a motorway with cars moving back and forth, plus much more.

The game still has the same basic feel as its predecessor, and doesn't appear to be any faster or smoother, but then the original was pretty good anyway.

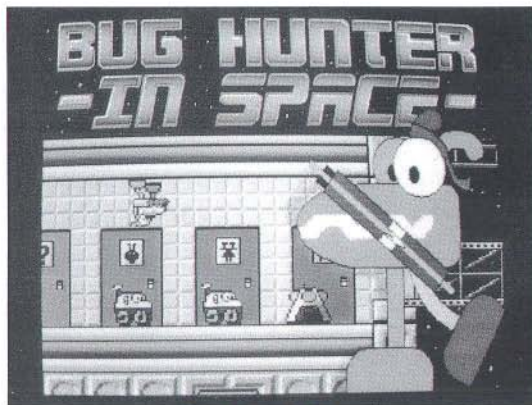
Is it worth buying this if you already have the original? Difficult question to answer, I'm afraid. Personally, I think it is but would advise you to see it for yourself before making your own decision.

BUGHUNTER IN SPACE

Remember my review of *Bughunter* just a few issues ago? Well, I did not exactly ooze enthusiasm for the game. Obviously this didn't worry Minerva too much as we now have the sequel, *Bughunter In Space* (£17.05). Looks like we are in for a Repton-type series here folks.

Never mind. Actually this is better than the original. The idea of the game is the same, whereby you guide your bug-hating friend around killing the creepie-crawlies by dropping things on them. The scenario is set in an alien spacecraft, and you must kill off all the bugs and stop the engines and the reactors to save the world.

As with the first game, it is written in compiled Basic, so the graphics are a bit jerky. Nonetheless, they are well designed and thought out. Sound is quite good with a catchy intro tune and some interesting effects.



Bughunter In Space

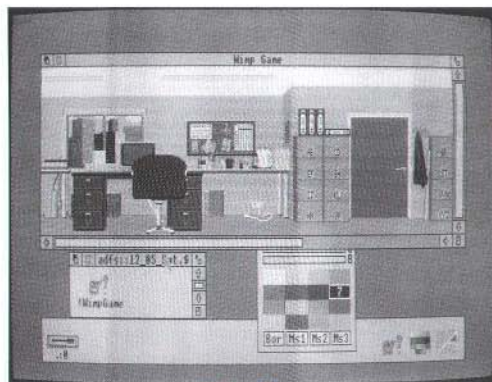
Where this game really scores, is the humour and the 'cuteness' of the whole thing. It is a relatively simple game to play and, I imagine, will find most favour with the fairly young. Recommended.

THE WIMP GAME

The *Wimp Game* (£18.95) is a new offering from the 4th Dimension. This is a Desktop

graphic adventure based on the history of Acorn. Essentially, you start off as an Electron owner and must work your way through the game solving puzzles, in your quest to become the owner of an R200 Unix workstation.

As it runs from the Desktop, it is ideal for those odd moments when you are bored with more serious tasks and want a little light relief. The game is all mouse driven, and you point to and click on objects to work your way round each location. There are plenty of interesting and well-drawn graphics along with nice sound effects for various objects. Certain items in each location operate exactly as they would in real life. For example, whilst in the kitchen you can switch on the kettle and make yourself a cup of coffee!



Wimp Game

What I like most about this game is the programmer's sense of humour. It states in the instructions that as in real life, anything that hurts when touched will do so in the game. Watch out for the fan in the first room!

This is a splendid piece of games software and I am sure it will be a great success. It has that all-important element of addictiveness, and once you start you won't want to leave it alone. I am sure that it will appeal to the whole family. Be advised though, that it is not a simple game by any

means, so it should keep you busy for some time. Very highly recommended for sheer fun and frustration.

PROFESSOR MARIARTI

After last month's review of the excellent Manchester United from Krisalis Software, we now have another new release from the same source called *Professor Mariarti* (£24.95).

This is another Amiga/ST port-over like *Man Utd*. What we have here is a ladders and platforms game unlike any other yet on the Arc. It is from the same gentlemen who brought you *Terramex* and *Pacmania*, so the standard of programming and game design is to a very high level.

The scene is set inside a chemical factory where you must guide our loony friend round five laboratories, closing down each one to avoid a potential disaster. There are lots of puzzles to solve in each and it is no walkover. You must collect coins along the way to enable you to buy more powerful tools to overcome the many adversaries you will meet. And believe me, there are plenty of nasties in this game.

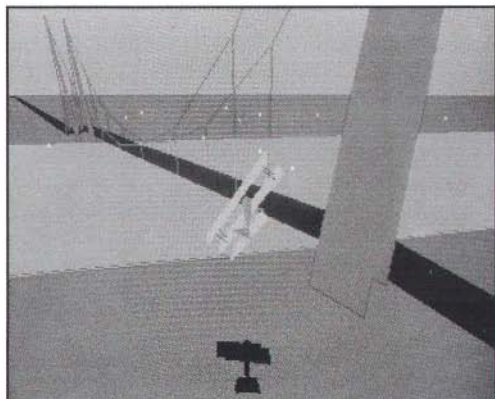
Graphics and sound in the game by no means stretch the Arc, but they are nonetheless excellent, not to mention rather 'cute'. You will need a sense of humour to play this game, and there is plenty of humour in it. For example, if you stop playing the game for a few seconds, the daft Professor takes off his glasses, gives them a quick polish and then taps on the monitor screen with his knuckles to wake you up!

Professor Mariarti (sic) is one of those games that has instant appeal, rather as Chuckie Egg had for so many people on the Beeb. It is easy to get into and addictive once started. I can't recommend this one highly enough. Buy it and I am sure you will not be disappointed.

LATE BREAK

Finally, I have just received some news from the guys at 4th Dimension. Sadly, the

bad news is that at the time of writing this (November '90) they say that *Break 147* will not be available until March '91 due to a decision to re-write much of said program. Oh well, let's hope it will be worth the wait.



Chocks Away

The good news, for those who have *Chocks Away*, is that 4th D have produced an upgrade for it that speeds the screen

frame rate by an average 70%. This makes the whole game much smoother. Also, there is now much more scenery and ground detail along with clouds in the sky. This upgrade is available to owners of the original game free of charge by sending their flight manual and a covering note to 4th D. A disc will be sent back to you that will convert your existing game disc.

Although not implemented in this upgrade, 4th D also told me there are plans afoot to develop the game even further in the future to allow you to play it with a friend via a modem, allowing you to have dogfights by telephone line!

The Arc games scene is getting better all the time. We hope for great things in '91 including the long-awaited mega-game Karma that I am told is now nearing completion. News of that will appear here as soon as I have my hands on it.

That's all for this month. See you soon!

All games reviewed this month are available from BEEBUG Ltd. **RU**

Base 5

Base5 DBMS is a unique kind of database management system specifically developed for the Archimedes. Unique, because it offers a complete database language and library, able to work from within your Basic programs. No "Tricky" code has been used so all Base5 programs are fully compatible with Basic compilers. The comprehensive documentation contains an extensive tutorial as well as a language reference. A number of databases and programs are also supplied as example material.

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Acorn's New Printer Drivers

Reviewed by Alan Wrigley.

As most of you will know, among the suite of applications which is supplied with every Archimedes is a set of RISC OS printer drivers. The underlying concept and the operation of these was explained fully in *Into the Arc* (Volume 3 Issue 8). To recap very briefly, a RISC OS printer driver performs the task of translating printer output into the codes and sequences required by the type of printer for which that particular driver was designed. This frees the application from the need to cater for different printer types, either now or in the future. Acorn itself produces four drivers, *PrinterDM*, *PrinterLJ*, *PrinterPS* and *PrinterIX*, for dot-matrix, LaserJet, PostScript and Integrex ink-jet printer types respectively. Other companies, notably Ace Computing (tel. (0223) 322559), also produce printer drivers for various types of printer.

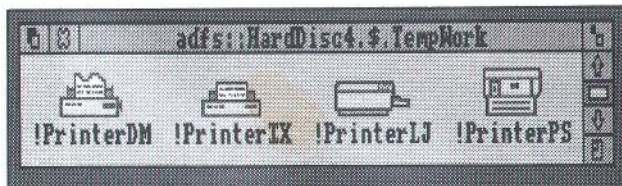
All Acorn's printer drivers have recently undergone a revision, and the new versions should be available by the time you read this. The driver modules are version 2.42 and the control applications either 2.44 or 2.46. Two major improvements have been made: there is now a "fancy" text option for text files, and it is now possible to print multiple files. I will look at each of these in turn.

FANCY TEXT

With earlier versions of the drivers, text, Obey and Command files (types &FFF, &FFE and &FEB respectively) were automatically printed as plain text (i.e. all bytes in the file were sent to the printer regardless). Other filetypes (e.g. Draw and Paint) would be referred directly to the application concerned, provided that a system variable of the type *Alias\$@PrintType_XXX* had been set up (this is normally done when the application has been "seen" by the filer). If an alias was not set, the user would be offered the option to print as text anyway.

The essential difference in the new versions is in the handling of type &FFF

text files, which are now printed in what Acorn describes as "fancy" text format. This means that printer facilities such as bold, italic and underline, and features such as line numbers and titles can be incorporated into the printed document by including control sequences. 1st Word Plus users will be delighted to hear that the control codes used are a subset of the 1st Word Plus codes, which means that many documents produced by that word processor can now be printed via the RISC OS drivers, which was hitherto impossible. The main omissions are headers, footers and graphics, though page-layout formats (rulers and page lengths) are recognised.

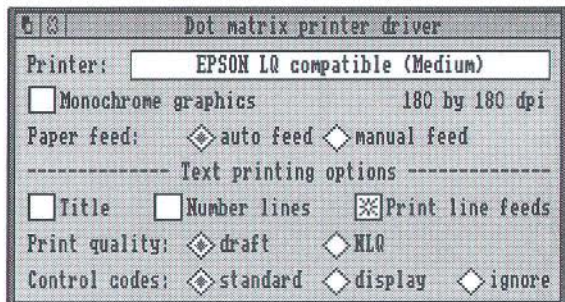


The four printer drivers supplied by Acorn

Clicking Select over the printer driver's control application on the icon bar now displays a much larger window than before. Most of this is taken up by text printing options, though there is also now an option to print graphics in monochrome; this speeds up the printing process but means that sprites and fonts, for example, are not half-toned. For text printing, there are options to print a "title" at the top of each page, to number each line of text, and to send line feeds. In addition, either draft or NLQ print quality can be selected, and you can choose whether to act on control codes and top-bit-set characters, ignore them altogether, or print them as a hex representation in the same way that Edit does on screen. The use of the word "title" is slightly misleading; this is not a user-defined title as you might perhaps expect, but simply the filename, time and page number.

Full details of the format for control codes are given in a *!Help* file within each

printer driver application, and so there is no need to repeat them here. By including the appropriate code within your document, it is possible to set the font size (Pica/Elite/condensed/enlarged), and toggle bold, light, italic, underline, superscript and subscript on and off. You can also send printer-specific control codes to your printer by prefixing them with a particular sequence, though it was of course possible to do this before, since all the bytes in a text file were sent to the printer anyway.



The control application window for the new Printer DM

The *PrData* file now has significantly more options defined in order to cater for the various possible control sequences. It also has a section headed *Printable character translations*, which enables you to specify a printer code sequence for any character, including top-bit-set ones, using the same technique that we pioneered with our *TextPrint* utility. As a result the file is very much longer, and Acorn has decided that, in the interests of faster loading, a squashed version of *PrData* can be used by the driver. However, an unsquashed version is also supplied to make editing easier, plus a program called *PrSquasher* which will produce the file which is actually used by the driver (see this month's *Hints & Tips* pages for a method of speeding up the loading process even further).

MULTIPLE FILE PRINTING

The second major enhancement to the drivers is the ability to print multiple files by queuing them. Dragging a file to the control application's icon while the driver is printing or paused causes it to be added to the queue. When the current print job is finished, the next in the queue is

printed. A *manual feed* option allows you to change paper between jobs by issuing a page prompt. It might have been useful to allow a directory icon to be dragged, in order to print all the files in the directory, but this is not possible. Also, it is not possible to drag files to the driver from an application's Save box while the driver is currently printing; this is because the queue stores names only.

The control application menu now has an additional destination option, namely *NFS*. This is for use with TCP/IP networks. Also the serial bug which was highlighted in RISC User (*Hints & Tips* Volume 3 Issue 5 and *Points Arising* Volume 3 Issue 6) appears to have been fixed, so that the correct stop bit/parity setting is shown on the *Stop Bits* sub-menu.

PERFORMANCE

Direct speed comparisons are not always very valuable, since a lot depends on the type of printer, the size of the printer's buffer, whether you are printing via a heavily-loaded network and so on. But from some quick tests using file output, it appears that PrinterLJ exhibits no difference in speed from the earlier version 1.12, PrinterPS is about twice as fast for text but unchanged for graphics, while PrinterDM is surprisingly 2-3 times slower for both text and graphics.

The new printer drivers can be downloaded from SID, or they can be obtained from Acorn dealers, though in the latter case the dealer may charge a small fee to cover costs. Eventually they will replace the existing drivers on Applications disc 1. They are well worth getting hold of, particularly if you do a lot of text printing (though note the comments on speed above). If you are writing applications which incorporate a built-in text printing facility, they will be invaluable, since there is no longer any need to concern yourself with the differences between various printer types.

This month's magazine disc contains the new versions of PrinterDM and PrinterLJ. Next month we will supply PrinterLJ and PrinterPS.

RU

Beebug Public Domain Software - New Releases!

This month we are adding 7 new discs (★) to our public domain library, to which further titles will be added in the future.

We are also offering a **Sampler** disc with a selection of public domain programs from all areas of interest. Unlike other Public Domain software, our discs contain as near as possible to 800k (and not less than 700k).

Each disc includes a 'Read Me' file, and there are some instructions with the programs.

The Public Domain discs are available only to RISC User members for £2.99 (postage is 60p for the first disc and 30p for each additional disc). The discs are offered as seen, and we cannot enter into any discussion regarding their contents.

To order phone (0727) 40303, Fax (0727) 860263, or write to (quoting your membership number):
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PD23 Disc ★

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PD24 Disc ★

Contains three demos, Demo, Gopher and Overscan.

PD25 Disc

Contains four demos, Deskballs, DudsDemo, EgIntro, and Z-Brother.

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Contains two demos, GrannyChow and Windows.

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Contains 10 games programs, Adventure, Battle, Battleships, Connect4, Darts, Fish (Pelmanism), Fruit Machine, Golf, Hangman and Impact.

PD20 Disc

Contains 12 games programs, Invaders, Line Of Five, Othello, Pelmanism, Rocks, Rubik Cube, Simon, Solitaire, Star Trek, Tetris, Tile Trial and Yahtzee.

UTILITIES

PD28 Disc

Contains 20 utilities of various types. These are all extremely good and there is something here no doubt to please everyone. Space does not permit full descriptions but the file list is, 1stFile, ASm2, CloseUp, Crypt, Dir, Display, Drawlink, Dustbin, Filetypes, FileUtils, Find, Keys, Loadprogs, MultiPrint, NewBar, NewCodes, PD_Impress, PrinterTx, ProgCalc, and Set_Type.

CLIPART AND PICTURES

PD29 Disc

Contains over 4 megabytes of Sprite pictures which can be used as clip art to load into DTP or use in your programs. The files are naturally in a compressed form and the disc contains the file to uncompress them and has instructions.

PD30 Disc

Contains over 2 megabytes of Sprite clip art and Draw files to load into DTP or use in your programs. The files are naturally in a compressed form and the disc contains the file to uncompress them and has instructions.

Public Domain Sampler Disc (PDS1)

This disc contains sample programs from the Beebug Public Domain Software Library. The programs are as follows:

STracker - The STracker application is used to play back a music file *Toccata* made of real sampled sounds which are sequenced to form a complete tune lasting several minutes. The quality of this is quite stunning, particularly if played through the computer's monitor speaker, or a hi-fi system.

Accounts - This is a home accounts program. There are no instructions included with the program but all functions are selected from the main menu which is self explanatory. An example file is included.

DiscLabel - This is a versatile disc labelling program producing professional looking labels for 3.5" discs. A Help file is included with the program.

Follow - This is a novelty program that when run puts a pair of beady eyes on the desktop that follow the mouse pointer wherever it goes. Eerie!

Hangman - A well presented and implemented version of the old word game of Hangman with an animated finale.

MultiPrint - A utility to allow the printing of files by creating a task list of the files to print before sending them to the printer. A Help file is included within the program.

Rotate - A fascinating animated demo in which you can alter the effects by pressing a few keys on the keyboard.

STD - A useful utility to search for telephone STD codes or find a town from its STD code. A ReadMe file is included in the program.

Wanda - A novelty demo program that infests your desktop screen with a shoal of bubble-blowing goldfish!

Mastering the Wimp

Part 15: Using Templates

by Lee Calcraft

Acorn's Template Editor - a multi-tasking application called FormEd - has been designed to simplify the process of creating windows and icons for Wimp applications. The latest version of this software (version 1.02) is included on this month's magazine disc, and is also downloadable from SID (Acorn's Support Information Database - see RISC User Volume 3 Issue 8).

To give an idea of the savings which can be made by using FormEd, take a look at the accompanying listing. This is a complete Wimp program for displaying a window containing a number of icons. We will take a closer look at this after we have explored FormEd itself.

USING FORMED

FormEd is supplied with a Help file which constitutes a very brief manual for the product, and it may be worth taking a look at this before using the program. A slightly fuller version is given in the Appendix of the ANSI C manual (pages 241-245), and this is worth a read if you can get your hands on a copy.

You start FormEd just like any other application, by double-clicking on its icon in a directory viewer, or by double-clicking on a template file. You will find that many Wimp applications make use of template files. These usually have the name *Templates*, and are located within the application directory of each task. Take a look for example at the templates used by Edit or one of the printer drivers - but if you try editing these by way of experiment, be careful not to save back the results, and overwrite the original.

CREATING A WINDOW

To illustrate the use of FormEd, we will create a window from scratch, and then add some icons to it. To do this,

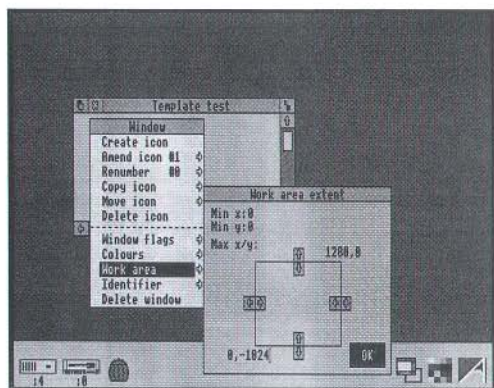
install the FormEd icon on the icon bar, and click on its icon. This will display a small empty window on the screen. Drag its size out to the size that you require for an imagined application, then click Menu over this window. The menu which appears is divided into two parts: the upper dealing with icons - most of which is greyed out - and the lower with the window itself. Move the pointer across the *Window flags* entry, and click with Adjust on *New format*. This sets the options for RISC OS windows. Now take a look at the various options below the dashed line in this sub-menu. All are ticked, but you can unset any of these with a click of the Adjust button. Your window will reflect the results (excuse the pun). Thus if you untick *Horizontal scroll* your window will lose its horizontal scroll bar, and so on.

Move the pointer across the *Title icon* entry to display the *Title flags* menu for the window. Then move across the Text entry, and type in the required title name. If the title of the window is to be more than 12 characters in length, FormEd will automatically make it indirected, ticking the *Indirected* entry on the menu.

Turning our attention to entries above the dashed line on the *Window flags* sub-menu, we can alter the flags which determine a number of further options. If you untick *Auto-redraw*, the window will become cross-hatched. This is merely a reminder that you have turned off the auto-redraw flag for this window, and that you will therefore need a redraw routine in the Wimp application which eventually makes use of the template. For the moment, *Auto-redraw* should be ticked.

The *Movable* flag is an interesting one. If you untick this option it means that your window will not be movable when it

manifests itself in your application. But it also makes it unmovable from within the Template Editor. This is because FormEd treats the windows and icons which you are creating in just the same way as any other Wimp task. The window will even respond to a click on the Close icon - but beware, as this will delete it completely. The *Movable* entry should be left ticked, while the others, such as *pane*, *keys* etc. can be left unticked for the moment. To check on the meaning of these various flags, see part 3 of this series (Volume 3 Issue 1 page 51), or the PRM pages 1175-1176.



Adjusting the work area extent of a new window

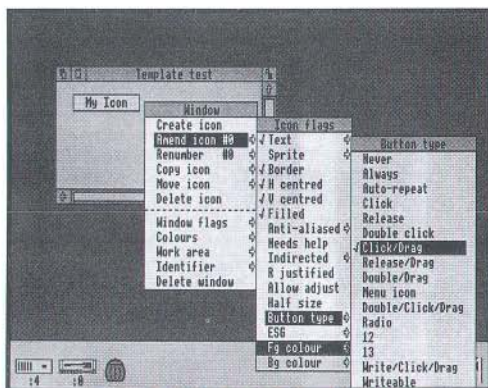
If you move the pointer across the confusingly named *Work area* entry in the *Window flags* menu, you can set the button type for the window. This allows you to determine the way in which the window will respond to the mouse. This can be left with *Click* ticked.

To alter the work area extent of the window, move across the *Work area* entry in the top level window menu. This brings up a dialogue box which contains a number of arrow icons which may be clicked on to alter the work area extent. In all cases, you cannot make this less than the visible work area currently displayed by the window. Once you have set up suitable values, click on *OK*.

Finally we need to give our window an identifier. This is a name of up to eleven characters which will be used to identify the window when loading its template into an application. Move the pointer across the penultimate entry in the top level menu, and type in a suitable name, and note down the name you have used. The program below assumes that the identifier is *TestWind*. If you are creating more than one window, you need to take special care to give them all an identifier, because FormEd will only remind you if none of your windows have identifiers, and when you come to save your window templates it will only save those with identifiers.

ADDING SOME ICONS

Creating icons is easy. Just click on the *Create icon* entry at the top of the *Window* menu in the Template Editor, and an icon will be put into the window. You will find that the icon is draggable. If you use the *Select* button you can drag the icon to anywhere within the parent window to reposition it. If you use *Adjust* on the other hand you will be able to drag its edges so as to resize it.



Setting the button type of an icon

Now click *Menu* over the icon, and move the pointer across the *Amend icon* entry. This brings up a menu of icon flags,

and these can be selected or deselected as required, in just the same way as the window flags. To turn the icon into a simple text icon, ensure that *Text* is ticked and that *Sprite* is unticked. Now move across the Text entry, and type in the required text. Again, if the text is to be more than 12 characters in length, FormEd will automatically make the text indirected.

You can now alter the other flags as required. For example, is a border required or not? Do you want the background filled etc. You may also want to alter the button type of the icon. By default this will be *Click/drag*. You may well require the icon to be of type *Click only* (i.e. no drag allowed), but if you make this selection you will not be able to move or resize the icon from within FormEd. It is usually best to leave the button type as *Click/drag* until you have finished editing.

One important point to note down on paper about your icon is its number. This is supplied in the second entry of the top level menu. It will say:

Amend icon #0

for the first icon, #1 for the second, and so on. You need to know the number of each icon, because this is the icon handle by which you will identify each icon when in dialogue with the Wimp.

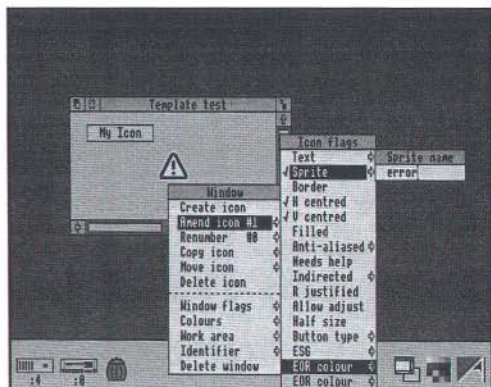
As you can see, the third menu entry allows you to renumber any icon. Remember though that if you supply a new number that already belongs to an icon, the Template Editor will swap the numbers of the two icons - very handy providing you know what is going on.

The *Copy*, *Move* and *Delete* icon entries on the top level menu need little explanation, except to add that *Move* moves the icon by a pixel at a time in the required direction.

SPRITE-ONLY ICONS

To create a sprite-only icon, proceed as above, but make sure that neither the

Indirected nor the *Text* options are ticked. Then tick *Sprite*, and move the pointer across this option to supply a sprite name. The Wimp sprites are loaded into FormEd automatically at start-up from a sprite file called *Default* within the FormEd directory, and if you select the name of any of these for the icon sprite, the sprite will automatically appear. You can view these sprites by loading the *Default* sprites into Paint. Alternatively, if you wish to use some other sprite, you will need to create this using Paint, then drag its sprite file to the FormEd icon on the icon bar to make it available from within the Template Editor. The *!Run* and *!Boot* files of your finished application will also need to **IconSprites* this sprite file to load its contents into the Wimp sprite area.



Incorporating a Wimp sprite named "error"

As an example, enter the sprite name as:

error

A large error triangle will appear in the target window. You will probably not want the border or the filled background, so untick these from the Icon flags menu, but before doing so, enlarge the icon borders to encompass the full sprite image.

Unfortunately there is no space here to cover the creation of mixed text and sprite icons in any detail. Briefly, the icon flags should be set to *Indirected*, and

while both Text and Sprite entries should be ticked, only the Text entry should hold a name. Assuming that the sprite name is different from the text used, the sprite name should be entered as a validation string in the *Valid* option of the *Indirected* entry. The name must be preceded with an "S". So to use a sprite called "error", a validation string of "Serror" would be used. More on this can be found in the PRM page 1186.

Once you have created all the icons for your window, and positioned them as required, you should move the window to the position on screen where you wish it to first appear in your program, and save the template as follows. Select the *Save templates* option from the icon bar menu, and drag the template icon to an application directory, using the default name *Templates*. This will save all the windows present in the editor, together with all their icons. The *Quit* option can now be used to exit FormEd - but note that this option kills its task without any warning, even if you *haven't* saved the last two hours' work!

A TEMPLATE-BASED TASK

The program in the accompanying listing is a complete Wimp application. It has a single window, and does not install its icon on the icon bar. Nevertheless, you can see what great economy of code has resulted from the use of templates. To make the program function, you will need to save it with the name !RunImage in a suitable application directory. The easiest way to generate this (and the accompanying !Run and !Sprites files) is to use the Application Shell Generator (RISC User Volume 3 Issue 2, and the Volume 3 Special Disc). The template file created above should also be saved to this directory, using the name "Templates".

HOW IT WORKS

The program uses three new SYS calls:
SYS "Wimp_OpenTemplate"

SYS "Wimp_CloseTemplate:"

SYS "Wimp_LoadTemplate"

After initialising the task as usual, "Wimp_OpenTemplate" is called, supplying the full path to the template file. It is assumed that the name of the application is "IWimp15", and this should be altered as appropriate. "Wimp_LoadTemplate" is then called, supplying the address of a suitable block of memory in R1 (note that this must be large enough for the window and all its icons - 88 bytes for the window plus 32 for each icon plus room for all indirected data). R2 and R3 supply the start and end address of additional workspace for indirected icons, including the window title.

block%!24 is set to -1 to ensure that our window will be opened at the top of the pile, then "Wimp_CreateWindow" is called. This creates the window, and assigns its handle to the variable *whandle*.

If the Template file holds templates for other windows, the template load, and window creation calls should be repeated for these. Finally, as in line 160, "Wimp_CloseTemplate" is called to close the template file. The program can now proceed with similar code to non-template programs.

By using templates we have thus avoided the substantial overhead of code required for creating windows and icons, and at the same time we have had the benefit of WYSIWYG editing facilities, enabling us to create more balanced displays. On the down side, you will still need a function for creating icons if you want to place an icon on the icon bar, and FormEd provides no help in the creation of menus - this must still be performed by hand - though we expect next month's disc to contain a Wimp Menu editor which may fit the bill.

Next month we will be looking at ways of optimising the speed of window redrawing.


```
Set Wimp15$Dir <Obey$Dir>
IconSprites <Obey$Dir>.!Sprites
WimpSlot -min 16K -max 16K
Run <Obey$Dir>.!RunImage
```

!Run Obey file for the task

```
10 REM ><Wimp15$Dir>.!RunImage
20 REM >Wimp15-1
30 REM Program Simple Template Demo
40 REM Version A 0.1
50 REM Author Lee Calcraft
60 REM RISC User Jan/Feb 1990
70 REM Program Subject to Copyright
80 :
90 DIM block% &200, iblock% &100
100 $block%="TASK"
110 SYS "Wimp_Initialise",200,!block%,
"Test" TO version%,task%
120 SYS "Wimp_OpenTemplate",,"<Wimp15$
Dir>.Templates"
130 SYS "Wimp_LoadTemplate",,block%,ib
lock%,iblock%&100,-1,"TestWind"
140 block%!24=-1
150 SYS "Wimp_CreateWindow",,block% TO
whandle%
```

```
160 SYS "Wimp_CloseTemplate"
170 !block%=whandle%
180 SYS "Wimp_GetWindowState",,block%
190 SYS "Wimp_OpenWindow",,block%
200 quit%=FALSE
210 ON ERROR PROCerror
220 REPEAT
230 SYS "Wimp_Poll",&81831,block% TO
reason%
240 CASE reason% OF
250 WHEN 2:SYS "Wimp_OpenWindow",,
block%
260 WHEN 3:quit%=TRUE
270 WHEN 17,18:IF block%!16=0 THEN
quit%=TRUE
280 ENDCASE
290 UNTIL quit%
300 SYS "Wimp_CloseDown"
310 END
320 :
330 DEFPROCerror
340 !block%=ERR
350 $(block%+4)=REPORT$+" (internal er
or code "+STR$ERL+")"+CHR$0
360 SYS "Wimp_ReportError",block%,1,"T
est window"
370 ENDPROC
```

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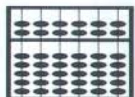
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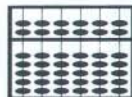
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Programmer's Workshop

Understanding E-Format Discs

David Spencer looks at E-format discs in the renamed *Assembler Workshop* series, which will in the future cover all advanced aspects of the Archimedes.

ADFS under RISC OS supports three different floppy disc formats: L for compatibility with earlier non-Archimedes machines, D for use with the original Arc operating system - Arthur, and today's preferred E format. Similarly, hard discs can use variations of either D or E format. As both L and D formats are obsolescent, we will in this article study only E format. In next month's *Programmer's Workshop*, we will use the information given here to implement a disc sector editor for E format discs.

All E format floppy discs are 80-track double sided, and have five 1K sectors per track. To speed up disc access, the tracks are accessed in the order of side 0 track 0, side 1 track 0, side 0 track 1 etc. This allows two whole tracks (10K of data) to be read between each head movement. This technique of working in the sequence of sides rather than tracks is very common, and the term *cylinder* is used to represent all the tracks which occupy the same position on each side. For example, on a floppy, cylinder four consists of side 0 track 4 and side 1 track 4. E format hard discs are usually formatted with thirty-two 256-byte sectors per track. The number of cylinders and heads (sides) varies depending on the capacity of the disc, for example a Rodime 47Mbyte drive has 7 heads and 872 cylinders. The combination of cylinder, head and sector count for a disc is called the disc's shape or geometry.

DISC RECORDS

So that ADFS can find out details about the shape of a disc, each disc contains a 64-byte disc record which contains shape information and other parameters. The values contained in the disc record are given in table 1.

Offset	Meaning
0	Log2 sector size
1	Sectors per track
2	Heads (Sides)
3	Density
4	Length of ID field
5	Log2 bytes per map bit
6	Track to track sector skew
7	Boot option
8	Reserved
9	Number of zones in map
10-11	Number of unused bits in zone
12-15	Address of root directory
16-19	Disc size in bytes
20-21	Disc ID
22-31	Disc name

Table 1. The layout of a disc record

The value of byte 0 specifies the sector size as a log value, such that the sector size can be calculated as 2^{value} . For example, a sector size of 256 bytes is indicated by a value of 8 (2^8). Bytes 1 and 2 specify the number of sectors per track and the number of heads per cylinder, and the number of cylinders is calculated from the disc size held in bytes 16-19. For an 800K floppy this size is &C8000. The total disc size in bytes can be calculated by:

$$\text{size} = \text{bytes per sector} * \text{sectors per track} * \text{heads} * \text{cylinders}.$$

The density at byte 3 only applies to floppies, and will always be set to 2 to indicate double density recording of data for the standard ADFS formats. Bytes 22-31 hold the ASCII name specified using *NameDisc, byte 7 contains the boot option set with *OPT 4, and bytes 20-21 contain a sixteen bit disc ID. This ID is changed each time a disc is written to, and is used to distinguish between two discs with the same name. The remainder of the entries relate to the disc map, and will be studied shortly.

LAYING OUT THE DISC

As well as storing the contents of a file on the disc, it is also necessary to store the directories containing the file's catalogue information and details of where it is located on the disc. In addition, ADFS stores data showing how each sector on the disc is used - whether it is part of a file or directory, empty, or a defective sector. This information is contained in the so-called Disc Map. To complicate matters further, files on an E format disc can be split into several chunks, and it is the task of the disc map to indicate where the individual chunks reside.

The disc map consists of a number of zones, each of which occupies a single sector on the disc. Floppy discs are limited to a single zone, but hard discs can have as many as necessary. The format of the map can be hard to follow, but basically it splits the entire disc into a number of clusters, each consisting of a fixed number of sectors, and then for each cluster indicates whether it forms part of a file, is empty, or is marked as defective.

The first sixty-four bytes of each map zone constitute the map header. The first byte is a map checksum; the method of calculating which will be looked at next month. The next two bytes are an offset, in bits, to the first free cluster, and this will be covered later. The fourth byte is a number such that when exclusive-ored with all the fourth bytes in the other zones of the map gives a result of &FF. Finally, the next sixty bytes hold the disc record described earlier, except for the last four blank bytes. The disc record is only included on zone 0 of the map, with these 60 bytes being set to zero in all other zones.

The remainder map is treated as bit-stream, which means that rather than being considered as a series of bytes, it is viewed as a series of individual bits. Each bit, with the exception of the map header described above, represents a number of bytes of actual disc storage, the number of

bytes being specified in byte five of the disc record. The total number of bits making up the map is the number of bytes on the disc divided by the number of bytes represented by one bit. For floppies, each map bit represents 128 bytes of disc space. Therefore, the map entries take up a total of 6400 bits, or 800 bytes. The first bit in the map represents the first 128 bytes on the disc, the second the next 128 bytes and so on.

Now we can look at how the map is used to indicate what each cluster of disc space is used for. To start with, we need to introduce the concept of a file number which is a unique number identifying each object on a disc. The number of bits allocated to hold a file number is given in byte 4 of the disc record, and for a floppy is fifteen. The minimum file number usable is two, and this is reserved to represent the map itself and the root directory, both of which will always be present on a disc.

To see how the map is laid out, consider the object with file number two, which as stated represents the map itself and the root directory. For a floppy this always appears right at the start of the disc, and consists of two copies of the map, each of 1K in length, and a directory which occupies 2K. Two copies of the map are kept in case the first is corrupted, as this would render the disc unusable. The fragment therefore occupies a total of 4K, and requires $4096/128 = 32$ map bits' worth of disc space. This is entered into the map in the following format (in hex and binary).

&02	&00	&00	&80
00000010	00000000	00000000	10000000

The ordering is a little confusing, as the bits in each byte read from right to left, but the bytes themselves read from left to right. So, as a pure bit-stream the above is really:

[illegible]

The first fifteen bits, marked with '-' make up the file number, its length being obtained from the disc record. The field is

then padded with '0's, shown with '+', to fill the correct number of bits, and finally a '1' (=) is placed at the end to mark the end of the field.

This field from the bit-stream tells us the three things we need to know to access the file. Firstly, its position within the bit-stream indicates the area of the disc it represents. In this case, as it is right at the start it refers to the start of the disc (track 0 side 0). The file number specifies which object is occupying this area of the disc, and the total number of bits in the field from the start of the file number to the final '1' indicates the length of the fragment.

To locate a file on disc, ADFS reads into memory the map and the directory containing the file. The directory entry for the file includes its file number, and armed with this ADFS can search through the map looking for the field corresponding to the file. In the case of the file being fragmented into more than one piece, it will have a number of fields in the map, and searching continues until all the fragments have been found.

A defect is represented in the map by an object with the special file number of one. As for a normal file, the defect spans a number of bits according to its size, and is terminated with a '1' bit. This treatment of defects as special files means that defective sectors can easily be mapped out without disturbing any other data on the disc - it is just like creating an invisible file that cannot be deleted.

The ID field length imposes a minimum size that an object can be allocated. For example, on a floppy the smallest number of map bits required to represent an object is 16 - 15 for the ID, and the end of fragment '1'. Now, sixteen bits corresponds to 2K, or two sectors. This is wasteful because it means that even a single byte file will require two whole sectors on the disc. To overcome this, ADFS allows a fragment to be shared, reducing the minimum allocation

size to a single sector. For example, two one-byte files could both have the file number 3, which corresponds to a minimal size fragment of 2K, with each file occupying one sector. A sector offset number is included with the file number in the file's directory entry to indicate this.

All that remains is to explain how free space on the disc is represented in the map. Basically, it is held as linked list of free space. The second and third bytes of each zone header hold an offset in *bits*, to the bit in the map representing the first free cluster on the disc, or zero if there is no free space. This bit offset, which always has bit 15 set, is an offset from the start of the second byte of the map header, i.e. the ninth bit. The map entry for the free space is like the entry for a file, except that the file number is replaced by an offset to the next free area in the map, or zero if at the end of a list. When creating a new file, ADFS can search through the list to find a suitable sized chunk and use that.

If you found the above heavy going, then you are not alone. The best way to understand the map structure is to take a floppy disc containing a number of files, preferably all in the root directory, and examine its map using the commands:

```
SYS "ADFS_DiscOp",1,0,&9000,&400
*MEMORY B 9000 +400
```

which will load and display the map. A list of file numbers can be obtained using:

```
*FILEINFO $.*
```

The first number displayed after the date is the total length of the file. This is followed by the file number in the form &XXXXXXYY, where XXXXXX is the file number proper, and YY is the sector offset within the file for split fragments. The file number is followed by the disc address of the file if it is in a single chunk, or a list of disc addresses and lengths if the file is split into several chunks.

Next month we will look at the directory structure and some points relating to hard discs in particular, before moving on to the disc sector editor. **RU**

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Into the Arc

Colours made easy (Part 2)

By Mike Williams

In this article I propose to pick up where I left off last month in looking at the use of colour on the Archimedes. However, there will be one significant difference from the approach last time. Then, we were able to use the Desktop palette to select and choose colours which we wanted to use. It's quite convenient, particularly for mixing colours, but it does have its limitations.

For example, if you leave the Desktop completely by typing Ctrl-Shift-F12 (rather than temporarily, which is what happens by pressing F12 alone), it appears that you can no longer control the choice of colour using a saved palette as described last time. However, using:

```
*PRINT !Palette
```

(or whatever name you saved the palette under) will still work. Furthermore, as I said towards the end of last month's article, the palette has no effect anyway as far as the 256 colour modes are concerned.

Assuming that we are interested in programming in Basic, I want to look more carefully at how colours can be selected and controlled directly within Basic, first of all in the 16 colour modes we looked at last time, and then in the 256 colour modes. I will also treat this in simple terms, which means that we are not using the Wimp manager or attempting to write a Desktop program, although any saved Basic program can be run from the Desktop by double-clicking on the program's icon in a directory viewer.

In all that follows, I will assume that we have entered Basic by pressing Shift-Ctrl-F12 to leave the Desktop, and then:

```
Basic
```

to enter Basic. To return to the Desktop at any time you will need to type:

```
*Desktop
```

to quit Basic and return to the Desktop. Remember that because the Desktop was completely abandoned on entering Basic, the Desktop is re-drawn from fresh (and any windows previously open will no longer be shown).

MIXING COLOURS IN 16 COLOUR MODES

Make sure that you select mode 12 before you start. As we saw last month, colours are referred to by numbers in the range 0 to 15 (16 colours in all). For displaying text, the statement:

```
COLOUR n
```

where 'n' is a number in the range 0 to 15 will select the colour in which all following text will be displayed (until another colour is chosen). Initially, when selecting mode 12 say, the 16 colours will be the defaults of 8 flashing (numbers 8 to 15) and 8 non-flashing (numbers 0 to 7) compatible with the old BBC micro as documented in the User Guide. These colours are quite crude in appearance and you will probably want to change them.

We can mix a new shade of colour (from the 4096 available) to be associated with any of the 16 colour numbers (0 to 15). To do that you need to use the Basic statement:

```
COLOUR n, r, g, b
```

In this, 'n' is the colour number to be redefined, and 'r', 'g', and 'b' represent the proportions of red, green and blue respectively to make up the new shade. Strictly speaking the values of 'r', 'g' and 'b' should each be in the range of 0 to 255 increasing in steps of 16, but it is usually easier to think of the instruction in the form:

```
COLOUR n, 16*r, 16*g, 16*b
```

Then each of 'r', 'g' and 'b' can be simply in the range 0 to 15. For example:

```
COLOUR 1, 16*0, 16*8, 16*9
```

makes colour 1 a quite pleasing shade of blue-green. Similarly:

```
COLOUR 2, 16*14, 16*11, 16*0
```

produces a dark golden shade which now becomes colour 2.

The Desktop palette can still be a good way of mixing a shade of colour which appeals to you. Experiment with that in the Desktop until you achieve a colour shade which appeals, and work out the number of increments of red, blue and

green on each of the slider bars as described last month. Then go back into Basic, and substitute the values you have noted down in the COLOUR instruction as above. The values used to define colours '1' and '2' above were obtained in this way.

However, this only defines the shade of colour for colour 'n' (though we can define up to 16 different shades). To display text in this colour we will also need to select a colour by executing:

```
COLOUR n
```

where 'n' is the number of the colour we want to use. With the example colours:

```
COLOUR 1+128
```

```
COLOUR 2
```

will ensure that subsequent text appears in gold on a blue-green background. Note that by adding 128 to the colour number, the colour shade selected is used for the background. The default mode 12 colours are 7 for the foreground and 128 for the background. For the best result, a CLS instruction following these two COLOUR statements will clear the entire screen background to colour '1' (or CLG for graphics).

So, to summarise where we have got to, a statement of the form:

```
COLOUR n, 16*r, 16*g, 16*b
```

mixes the proportions of red, blue and green to produce a shade of colour for colour 'n'. The statement:

```
COLOUR n
```

selects the current shade of colour 'n' for all following text. Of course, we can define up to 16 different shades of colour at the start of any program, and then select any of these for use as and when required. It's rather like mixing a set of paints to go in your paint box (rather than buying a ready made set), and then choosing a colour by its position in the paintbox when you need it.

Although we have talked about using colour for text, colours can equally be used for graphics work. The only difference is in how the colour is chosen, not in how the shades of colour are mixed. The statement:

```
GCOL n
```

will do for graphics what:

```
COLOUR n
```

does for text, and again adding 128 to the value of 'n' will select a shade of colour which is used for the background, rather than for any subsequent graphics.

To finish this section here's a very short demonstration which displays an orange rectangle on a blue background:

```
100 MODE12
110 COLOUR 1,16*15,16*8,16*0
120 COLOUR 2,16*4,16*8,16*10
130 GCOL 1:GCOL 128+2:CLG
140 RECTANGLE FILL 340,312,600,400
150 END
```

USING COLOURS IN 256 COLOUR MODES

At the end of last month's article I left you with a question relating to the 256 colour modes: how to get the promised 256 colours when only 64 appeared to be possible. It is no longer feasible to think in terms of mixing colours, but we need to know how to select any of the 256 colours available. In any 256 colour mode, like mode 15 for example, the COLOUR statement (or GCOL for graphics) specifies as before which colour is to be used for subsequent text or graphics. If you run a short program like this:

```
100 MODE 15:VDU14
110 FOR colour=0 TO 63
120 COLOUR colour
130 PRINT"Colour ";STR$(colour)
140 NEXT colour:VDU15
150 END
```

you will find that 64 lines of text are displayed down the screen, though you will have to press Shift to scroll through the last 32 (this is the effect of the VDU14 in line 100 - without it the program would scroll through all 64 lines so quickly you wouldn't notice the first 32 lines - VDU15 at the end of the program restores the status quo). Each line simply consists of the word "Colour" followed by the corresponding colour number, and in the corresponding colour for that number.

However, as I said last time, if you make the loop run from 0 to 255 you still won't get more than 64 colours. Also, as with the 16 colour modes, if you add 128 to the colour number specified (in line

120), then it is the background colour which is selected rather than the foreground.

So how do you achieve those mythical 256 colours? The answer lies in the use of a further keyword TINT. In effect, each colour selected can be modified by one of four levels of tinting. Of course, this is once again not quite as simple as you might expect (or prefer). The value of TINT can range from 0 to 255 (not just 0 to 3). We can summarise this in the table below.

TINT range	TINT level
0-63	level 0
64-127	level 1
128-191	level 2
192-255	level 3

In a way, the level of tinting determines the amount of white to mix with the original colour. We might as well use four fixed values, 0, 64, 128, and 192 (and indeed write these as 64 times 0, 1, 2, and 3). To see the effect of this, modify the original program so that it reads as follows:

```
100 MODE 15:VDU14
110 FOR colour=0 TO 63
115 FOR t=0 TO 3
120 COLOUR colour TINT 64*t
130 PRINT"Colour ";STR$(colour)
135 NEXT t
140 NEXT colour:VDU15
150 END
```

When you run this program you will be able to see the full range of 256 colours, but notice how the colours all appear in groups of four - this is the result of successively adding four different levels of tinting to one basic colour achieved in the inner FOR-NEXT loop starting at line 115. Curiously, perhaps, if no tint level is specified the resulting colour is that which would result from a tint level of 192 (maximum white or brightness). As before, if the colour number has 128 added to it then the resulting colour, including any tint, relates to the background, rather than the foreground, and foreground and background colours can be specified independently.

If you want to select colours for graphics work in the 256 colour modes, then GCOL should be used instead of COLOUR. As before, the keyword TINT should be used in conjunction with GCOL to achieve the full range of 256 colours.

To finish, let us summarise what we have covered:

16 COLOUR MODES

COLOUR n, 64*r, 64*g, 64*b
mix red, green and blue to produce a colour for 'n'
COLOUR n
select colour 'n' for text
COLOUR n+128
select colour 'n' for the text background
GCOL n
select colour 'n' for graphics
GCOL n+128
select colour 'n' for the graphics background

where 'n' is in the range 0 to 15, and each of 'r', 'g', and 'b' is in the range 0 to 3.

256 COLOUR MODES

COLOUR n TINT 64*t
select colour for text
COLOUR n+128 TINT 64*t
select colour for text background
GCOL n TINT 64*t
select colour for graphics
GCOL n+128 TINT 64*t
select colour for graphics background

where n is in the range 0 to 63, and t is in the range 0 to 3.

As a footnote, if you are considering writing a Wimp program in Basic, then commands like COLOUR and MODE should be avoided or the settings you choose within your program will affect other Wimp programs active at the same time. Instead you should use SYS calls such as:

```
SYS "Wimp Colour",n
```

For that you really need access to the Programmer's Reference Manual, but that is another story, and one which has no place within this series.

RU



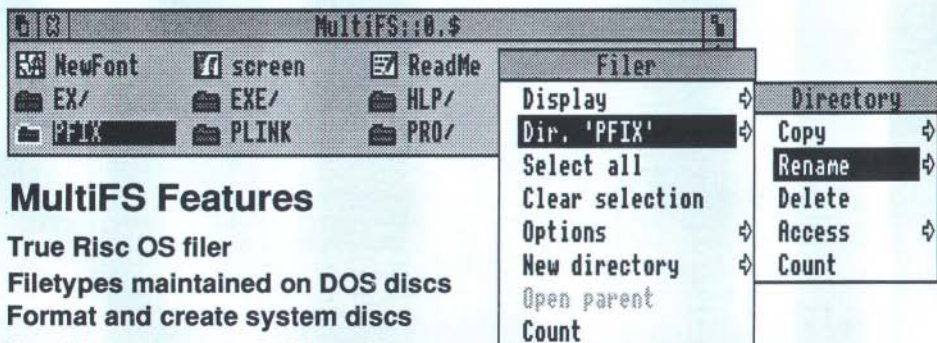
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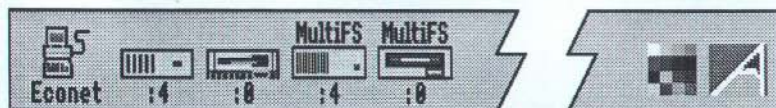


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Introducing C

Part 7: Formatted Input and Output

by Dec McSweeney

C is supplied with a whole family of input and output routines, several of which have already been used quite extensively. Two of the most important functions (*printf* and *scanf*) have only been glimpsed, and now I'd like to present them in a fuller light. This is not going to be an exhaustive definition, which you'll find in any C tutor, but it will indicate their power, and complexity.

The "family" under discussion consists of *fprintf* and *fscanf*, which transfer data to and from files, and *sprintf* and *sscanf*, which format data within the program's memory. Advanced C users will be aware of the "variable argument" variants of these (*vprintf* and so on), but these will not be discussed here.

In general, *printf*, *scanf* and their ilk take a variable number of parameters one of which is known as a format control string. This effectively tells the function how many arguments have been passed to it, and controls the way in which they are processed. Because of this, it's important that the number and type of arguments agrees with the format string, or dire consequences may result. The prototypes for these functions are:

```
int printf(char *format, ...);
int fprintf(FILE *fp, char *format, ...);
int sprintf(char *str, char *format, ...);
int scanf(char *format, ...);
int fscanf(FILE *fp, char *format, ...);
int sscanf(char *str, char *format, ...);
```

The ellipsis (...) indicates that zero or more arguments follow. The character array 'format' can be a quoted string, as used in previous instalments, or it can be a variable.

The functions are all of type *int*. The *printf* group returns the number of characters output (in the case of *sprintf*, excluding the terminating \0). The *scanf* group returns the number of input items assigned.

The format string may contain any sequence of characters. These are simply copied to the output stream until a '%' or '\' is encountered. The backslash introduces an "Escape sequence" - an otherwise unprintable character, such as Newline (\n), Formfeed (\f), and so on. The percent sign marks the beginning of a conversion string. When *printf* encounters a '%' it converts the next argument according to the characters following the percent sign. You've already met %s for strings (strictly, pointers of type char) and %d for decimal integers. Other conversion types are:

Character	Meaning
x	Hexadecimal integer, using lower case 'a' - 'f'
X	Hexadecimal integer, using upper case 'A' - 'F'
f	Floating point number
e	Floating point number in the form n.n...nEmm
g	Select %f or %e whichever gives the shortest output
%	Print a percent sign

The full list will be found in any C tutor. While the percent sign marks the beginning of the conversion, the letter marks the end. Between the two you can specify various other characteristics of the output such as field width, accuracy, zero suppression and so on.

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The general format of a conversion string is `%-n.mlx` where:

`n` is the minimum field width. If `n` has a leading zero, zero suppression is NOT performed (strictly speaking, the field is padded with zeros rather than spaces);

`m` is the precision (for floating point numbers) or the maximum number of characters to be printed from a string, or the minimum number of digits for an integer;

`l` is the lower-case letter `L`, used to signify that the variable is of type `long` (when used with `ints`) or `double` (when used with `floats`).

`x` is the conversion character as above.

The optional minus sign indicates left justification of the converted value. Even strings are usually right-justified within their field!

Here are a few examples; each group is preceded by the definition of the variable printed. The colons show the exact size of the field, an idea I've borrowed from the standard work on the language, *The C Programming Language* by B.Kernighan and D.Ritchie (second edition - every home should have one!).

Conversion String	Result
-------------------	--------

```
int x = 13579;
```

1. <code>%d</code> :	<code>:13579:</code>
2. <code>%06d</code> :	<code>:013579:</code>
3. <code>%-8.3d</code> :	<code>:13579 :</code>
4. <code>%08.13d</code> :	<code>:0000000013579:</code>

Line 1 shows the default format. In line 2 the minimum field size is specified and zero suppression is cancelled. The

field is left justified in line 3, and line 4 shows how the precision overrides the minimum field width.

```
float one_seventh = 100000.0 / 7.0
```

1. <code>%f</code> :	<code>:14285.713867:</code>
2. <code>%06.9f</code> :	<code>:14285.713867187:</code>
3. <code>%9.12f</code> :	<code>:14285.713867187500:</code>
4. <code>%-29.22f</code> :	<code>:14285.7138671875000000000000 :</code>
5. <code>%.4f</code> :	<code>:14285.7139:</code>

The definition requires explanation here. The numeric constants must have the decimal point otherwise `C` treats the division as of type `int`, which would yield exactly 14285 - the result is truncated, not rounded. The default precision is six decimal places. A `float` number is accurate to 6 digits in Acorn ANSI C, although it will print up to 10 decimal places. Don't ask me why! Note how the field in line 4 is 29 characters wide including the decimal point and the trailing space, and that rounding does take place at line 5.

```
double another_seventh = 100000.0 / 7.0
```

1. <code>%lf</code> :	<code>:14285.714286:</code>
2. <code>%06.9lf</code> :	<code>:14285.714285714:</code>
3. <code>%9.12lf</code> :	<code>:14285.714285714286:</code>
4. <code>%-29.22lf</code> :	<code>:14285.714285714286200000000000 :</code>
5. <code>%.4lf</code> :	<code>:14285.7143:</code>

The answer here is accurate to 12 decimal places (a total of 17 significant figures) which is sufficient for most purposes. Check your supplier's documentation for details of the precision you can rely on - Acorn gives a value of 15 significant figures for type `double`. The symbolic constants `FLT_DIG`, `DBL_DIG` and `LDBL_DIG`, #defined in `float.h`, give the "digits of precision" for types `float`, `double` and `long double` respectively, which allows you to check the value prevailing at run time, and act accordingly.

```
char str[13] = "Twelve chars";
```

```
1. :%s:           :Twelve chars:
2. :%15.10s:      :   Twelve cha:
3. :%-15.10s:     :Twelve cha   :
4. :%10s:         :Twelve chars:
5. :%.10s:        :Twelve cha:
```

Note the right justification at line 2, and the difference between line 4 (where the minimum field width is specified) and line 5, where the "accuracy" is specified. If you want to truncate a string from the left (giving "elve chars", for example) you should pass the appropriate pointer to `printf` - in this case (`str+2`).

The fact that C will not truncate a numeric field to a specified size is both a blessing and a curse; it can play havoc with tables of figures, for example, but it does mean that no data is lost. It is possible to align columns by exploiting the fact that `printf` returns the number of characters it has output, and another conversion character, '*', which may appear either in the width or precision area. This returns the value of the next argument which is then used for the specification. The examples above were tabulated using this facility.

The left-hand part was printed thus:

```
x=printf("%2d :%s:", n, fmt);
/* n=1 to 5, converted by '%2d'
fmt= {for example} "%10s" converted
by '%s' */
```

After this call to `printf`, `x` contains the number of characters output. The right-hand part followed:

```
printf("%s:", 20-x, " ");
/* the correct number of spaces */
printf(fmt, str);
/* str contains "Twelve chars" */
printf(":\n");
/* end of the line          */
```

The first `printf` outputs a field exactly 20-x characters wide, which contains a single space (right-justified, if anyone cares). Note how the variable `fmt` has been used both as a format control string and as a variable - the poacher turned gamekeeper!

Here's a routine which exploits the variability of the field width. The object was to print totals held in the array `total[]` at the foot of columns of figures; the offset of the right-most digit in each column was stored in array `wid[]`. `max_n` holds the highest subscript used in the arrays.

```
for(n=max_n; n >= 0; n--)
    printf("%*d\r", wid[n], total[n]);
```

This prints the rightmost total first, space filled to the left. The Escape sequence "\r" denotes "Carriage Return", without Line Feed. This allows the totals to appear on the same line.

FORMATTED INPUT - SCANF()

The formatted input command `scanf` works along broadly similar lines to `printf()`. The major difference is that the arguments to `scanf` must be pointers to the variables which will hold the data. This is a good place to start looking if your C programs don't work! Almost everyone forgets sooner or later. The address of a variable 'var' is given by '&var' or by a pointer to which the address has been assigned. We could have used `scanf()` in `write_bstring()` last month; the inner `do` loop would be replaced by:

```
scanf("%s", &bstring[0]);
```

Remembering that the name of an array is a pointer to element 0, this could be written:

```
scanf("%s", bstring);
```

One disadvantage of `scanf()` is that any 'white space' character (the general term

for Space, Tab, Vertical Tab, Formfeed, Carriage Return and Newline) terminates a conversion. This means that *write_bstring* would write output one word at a time.

Any non-conversion characters (such as the colons in the *printf* examples above) must be matched on the input stream. If such a match fails *scanf* terminates. This can obviously cause problems with keyboard input; you may have had fun with *sqrt* from part 3 of this series!

scanf() returns the number of items successfully matched and assigned. If end-of-file is reached during a conversion, *scanf* returns the value EOF - this is #defined in *stdio.h* as a value which cannot be confused with a character or item count (usually -1, but test for EOF for portability!)

Why should you expect EOF in keyboard input? In the first place, many operating systems allow the input stream to be redirected - that is, input may be coming from a file (see below). Naturally, when the input file is exhausted you would want the program to be able to detect it. Secondly, you can simulate EOF at the keyboard by entering Ctrl-D. This also works on Unix and MS-DOS by the way. Finally, this allows the whole *scanf* "family" to behave in similar ways under analogous circumstances - the designers of C have sought everywhere to exclude special cases as far as possible.

REDIRECTING INPUT AND OUTPUT

A remarkably useful feature of C programs is their ability to redirect their input and output. This facility is borrowed from Unix and MS-DOS and their obsolete forebears. Essentially, a program which is written to take input from the keyboard and output to the screen can take input

from a file, write its output to a file or both. The syntax will be familiar to users of the above-mentioned operating systems. To run a C program called *myprog*, using input stored in "keystrokes" and writing output to "printout", you would type the following at the command line:

```
*myprog <keystrokes >printout
```

The '<' controls redirection of the standard input stream (*stdin*), while the '>' controls the standard output stream (*stdout*). What about the standard error stream (*stderr*), I hear you cry? In the present case, any output sent to the standard error stream would still appear on the screen. To send the error stream to a file called *errors*, you would type the following:

```
*myprog <keystrokes >printout 2>errors
```

The basis for this notation lies in the conception of *stdin* as stream 0, *stdout* as stream 1 and *stderr* as stream 2. The zero and one are not usually specified though you can do so if you like. To redirect *stdout* and *stderr* to the same file, you could type:

```
*myprog 0<keystrokes 1>printout 2>&1
```

or in a shorter form:

```
*myprog 0<keystrokes >&printout
```

which means "send stream 2 to wherever stream 1 is going". If the "2>&1" appeared before the ">printout" the *stderr* output would still appear on the screen as at that point that is the current destination of *stdout*.

It is useful, when developing programs, to have some way of following progress on screen, so I would not recommend redirecting *stderr* until you are satisfied your program works properly, or unless you want to preserve the output for a later post mortem.

RU

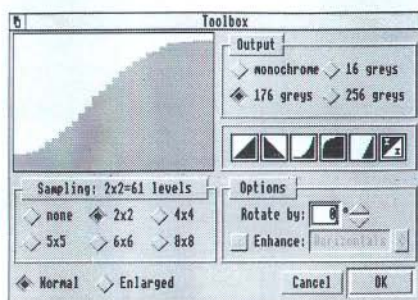
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Scan-Light toolbox.

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Hints & Tips... Hints & Tips

END

Andrew Cumming

In *Hints & Tips*, Volume 3 Issue 8, the Basic variable END was described. Problems may arise if you are writing a program that needs a variable stack of memory, such as a text editor. It is difficult to alter the size of this stack using END. For example, you could start with a 16K stack using *DIM block 16383*. But supposing you then increase the application workspace by another 16K using END - how can you enlarge the stack? You cannot simply write beyond the original 16K as this could erase other variables. It would be possible to dimension another, larger block with the same name as the first, but the old block is not released first and remains unusable, thus defeating the object of having variable workspace in the first place.

END uses SWI "Wimp_SlotSize" to alter the size of workspace, and by using this call directly, you can have a separate area of memory above HIMEM, i.e. independent of Basic. If you make the parameters of the *WimpSlot command in the !Run file large enough to hold just the program and any variables, you can use SWI "Wimp_SlotSize" once the program is running to increase the application workspace. Because Basic is unaware of the change in size, HIMEM will not alter, and the data can then be stored at HIMEM+1. Details on the use of the SWI are given in the PRM (page 1275).

Using the SWI directly avoids a further problem with END. END can only be used when the Basic stack is empty, i.e. outside any functions or procedures, whereas the SWI can be used anywhere in a program.

COPYING FILES WITH WILDCARDS

Lee Calcraft

When copying a file from one directory to another, an asterisk wildcard can be used in place of the leafname in the destination, for example:

```
*Copy :0.SourceDir.File :1.DestDir.*
```

This will give the copied file the same name as the original, and avoids the necessity for typing it a second time.

If wildcards are also used in the source specification, then this short cut can be used to transfer *all* the matching files to the

destination with their leafnames unchanged, as in the following example:

```
*Copy :0.SourceDir.*text :1.DestDir.*
```

This will copy all files in SourceDir on drive 0 whose names end in "text" into DestDir on drive 1.

OK BUTTONS

Alan Wrigley

According to RISC OS guidelines, when a window contains an OK button (i.e. an icon with the text "OK", which is used to confirm a selection or group of selections), the icon colours should be reversed whenever the pointer is over the icon. The way to do this is to set the icon button type to 9, i.e. a "menu" icon (see PRM page 1182). If you simply do this, however, you may find that, when the pointer is over the icon, it flickers continually between the two states. To avoid this, the icon must have an ESG (exclusive selection group) number to itself. This is determined by bits 16-20 of the icon flags, described on the same page of the PRM. This value may be any number between 0 and 31, but no other icon in the same window should have the same ESG number.

1ST WORD PLUS AND DESKJET PLUS

David Dodd

It is quite easy to use the HP DeskJet Plus printer with 1st Word Plus, and include most features such as expanded/compressed text, italics, bold and super/subscripts. In addition, all the extra symbols in the Archimedes Latin1 font can be printed. First a suitable 1wp_print file must be prepared. Start with the Matrix file in the Sources directory on the 1stWUP utilities disc, and substitute codes from the DeskJet manual. For example, command number 2C (Hex) selects compressed mode; on an Epson the code is 0F (Hex), and this must be changed to 1B,28,73,32,30,40 for the DeskJet Plus. By default the DeskJet Plus switches on in LQ mode, so I altered only the commands for draft fonts and left asterisks in front of the NLQ commands to disable them. If you wish to use draft quality it is easier to select it on the DeskJet keypad.

The DeskJet Latin character set can be selected as the default by using the printer's dip switches. This means that the character

Hints & Tips... Hints & Tips

translation table is extremely simple since all the entries can be removed leaving only a terminating zero byte at the end. The #, \$ and £ characters all print correctly, and all the exotic foreign characters can easily be produced.

BEDIT IMPROVEMENTS (1)

Glynn Clements

BEdit, the Wimp front end for the Basic editor originally published in Volume 3 Issue 4 has proved very popular. However, it would be useful, whenever a file is dragged to the editor, to set the CSD to the directory from which the file came, so that saving the file automatically saves it back to the same directory without needing to specify full pathnames. This can be done by replacing line 1590 in the published listing with the following lines:

```
1590 IF file$<>" THEN
1591 newpos%=1:REPEAT
1592 oldpos%=newpos%
1593 newpos%=INSTR(file$,".",oldpos%)+1
1594 UNTIL newpos%=1
1595 IF oldpos%>1 THEN OSCLI("Dir "+LEF
T$(file$,oldpos%-2))
1596 file$=" -load "+file$
1597 ENDIF
```

The above modification was incorporated into the version of BEdit included on the Volume 3 Issue 8 magazine disc, and also the Volume 3 Special Disc. This prompted the following hint from Leonard Hanson.

BEDIT IMPROVEMENTS (2)

Leonard Hanson

The hint given above is fine if you are happy to alter the CSD every time you use BEdit. If not, a neater solution is to use a system variable. To do this, change line 1595 as listed above to:

```
1595 IF oldpos%>1 THEN OSCLI("Set Bedit
$Scrap ""+LEFT$(file$,oldpos%-2)+""")
and add a further line:
```

```
1565 *Key 3 <0><483>|<Bedit$Scrap>.
```

(note the full stop at the end of the line). If you now use Ctrl-Shift-F3 to save the program instead of F3, it will be saved to the correct directory but the CSD will no longer be affected.

PRINTER DRIVERS

Derek Lucas

Editing a printer driver's *PrData* file to remove references to all printers except the one normally used can result in a considerable time saving when loading the driver. For example, the loading time for *PrinterDM* can typically be halved by this method. Make sure you keep a copy of the original file in case you change your printer at any time in the future!

RETRIEVING FILES

Matthew Astley

If you have ever deleted any files and later regretted it, it is possible to retrieve the data by *MAPping the disc and looking for gaps the same size as or bigger than the deleted file. Then use:

```
*Create <file> <length>
```

where *file* is an appropriate filename, and *length* is the length of the first gap on the disc. This will create a file of the specified length in the first available space. If there are a number of gaps, fill them all, starting with the first. Each file can then be loaded into Edit and the usable pieces of data saved. You will have to reset filetypes etc. yourself. This should work every time with D and L format discs, but with E format you may have to find several fragments of file and piece them together. Text files should be easy to reconstruct; machine code virtually impossible. The first byte of a sprite file is the number of sprites in the file.

RU

• POINTS ARISING • POINTS ARISING • POINTS ARISING •

PRINTER AND SERIAL BUFFER (Volume 4 Issue 2)

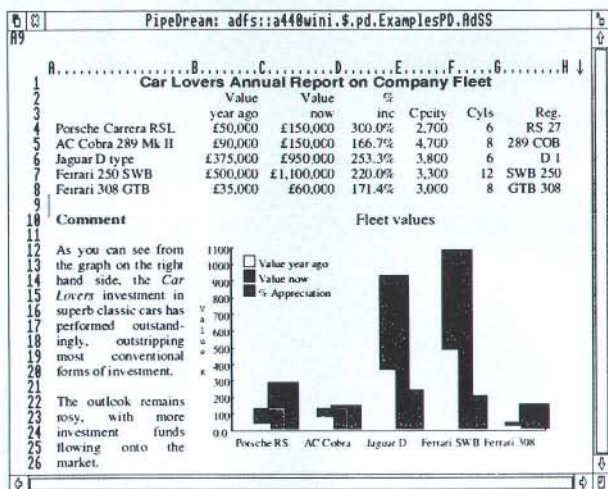
Unfortunately the listing as published (and as supplied on the magazine disc with the printer buffer front end) was set up as a serial buffer, and therefore will not work as a printer buffer. Line 120 in the *BufSource* program should be altered to:

```
120 IF serial% THEN buff%=2:P$="Serial"
ELSE buff%=3:P$="Printer"
```

and in lines 2570, 2630 and 2710, *CMP R1,#2* should be altered to *CMP R1,#buff%*. It will now be correctly set up for each application depending on the choice made when running the source program. An updated version of the buffer module is included on this month's disc.

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All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Linguistix's Presenter 2 and then loading the resulting graph back into PipeDream 3.

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MESSAGE FROM GROUND CONTROL

With reference to Lee Calcraft's comments on our Advanced Teletext System (see RISC User Volume 3 Issue 10), we have now released a new version (1.07) of the program with the following changes:

1. The Adjust button works as it should.
2. Redefinition of the palette is optional.
3. The two modules mentioned no longer have to be installed in the !System.Modules directory.
4. PROctune example now has dimensioned arrays.
5. 10 channels now available (from version 1.05 upwards).

There have been no changes to the Arthur version (1.01) and none are planned. We now supply a longer 1.1 metre lead.

Lee Calcraft made only brief mention of the auxiliary socket carrying the video and audio outputs. I believe this to be an important feature as it allows the user to effectively convert a Philips CM8833 (for instance) into a colour TV, receiving off air sound and vision.

The 1.07 upgrade is available at £5.00 including VAT and p&p to customers who either return their original disc or quote their sales or invoice number.

K.B.Reeman, Ground Control

Following your interesting review of Ground Control's Advanced Teletext System, I purchased one direct. I was also sent two separate notes regarding the use of their equipment with a printer switching box. The essence of this is that an unfortunate combination of lead length and type will cause data from the teletext adaptor to become corrupted by the time it reaches the computer due to crosstalk on the data lines. It is particularly noticeable when the cable is of the round type rather than flat ribbon cable. Ground Control say that changing a round cable for a flat ribbon type will completely cure the problem, and that a suitable cable is available from Care Electronics (tel. (0923) 672102) for £10.

Sir George Young

We present below comments on two of last month's reviews, on Inspiration from reviewer, Ian Waugh, and from Rob Macmillan on the review of Schema, a rival to Colton Software's own PipeDream 3.

INSPIRATION REVIEW

Further to my review of Inspiration in RISC User Volume 4 Issue 2 I would like to clarify a couple of points due to a misunderstanding which occurred somewhere between me and the printed page.

While Inspiration (£299.00) undoubtedly has more powerful edit and manipulation facilities than EMR's Studio 24 Plus (£189.00), it has none of the notation manipulation facilities which Studio 24 Plus does. Inspiration is on the expensive side compared with similar music software for the Atari ST (the two top ST programs, C-Lab's Notator at £499 and Steinberg's Cubase at £550, include notation and scorewriting facilities and are several degrees more sophisticated than Inspiration - the reference in the review to programs costing over £700 was clearly misleading).

Ian Waugh

SCHEMA REVIEW

We were rather surprised to read Crosbie Fitch's assertion that Schema is the only spreadsheet designed for RISC OS. PipeDream 3 was one of the first RISC OS programs available, and has attracted a very large and enthusiastic following.

When considering a "definitive spreadsheet" several important issues should be considered. Installed user base, data transfer to and from other packages and computers, usage on 1Mbyte machines, and speed of operation (the only speed figure given in the review would make PipeDream about five times faster than Schema on that particular measure) are some of the major areas where Schema lags behind PipeDream.

And, of course, PipeDream isn't just a spreadsheet!

Rob Macmillan, Colton Software
(originators of PipeDream 3)

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EMR Soundsynth £25, Interdictor II (unregistered) £25, Ibox £10, UIM £10, Fish! £10, Holed Out £8. Tel. 081-337 9306 4-8pm.

Archimedes 440/1 4Mb RAM, 50Mb hard disc with external 5.25" drive, colour monitor, Tandy wide carriage daisywheel printer and Watford modem, all manuals, software includes 1st Word Plus, Fortran, Hearsay and PC Emulator (including large range of MSDOS software), just one year old and has had little use. Offers in the region of £1950. Also Acorn A3000 colour monitor and RAM upgrade, this machine is practically unused and still under warranty. Offers in the region of £760. Tel. (0223) 872178.

Archimedes 310 Entry Level with RISC OS, PC Emulator, complete with four way backplane, fan, manuals and original packing £515. Canon PW-1080A dot matrix printer £120, Philips BM 7502 green screen monitor £45, all items in first class condition, home use only. Tel. (0734) 771230 days (0734) 784897 eves.

BEEBUG A310 external disc buffer £20. Tel. (0734) 874769 after 6pm.

Seagate 20Mb hard drive plus Computerware hard disc podule £170. Tel. (0328) 864177.

HP Deskjet Plus, 6 months old £300. Tel. (0603) 742638.

WANTED: Information and prices for expanding memory of Word Phrom in BBC B speech system. Tel. (0533) 376180.

10 year old beginner (& dad) with Arc. 310 would like to contact users in their area willing to offer advice. Haselmere, Bordon, Farnham. Tel. (0428) 713003.

Archimedes 310 colour, RISC OS, IFEL 4 slot backplane, fan, 5.25" external drive interface, 1st Word Plus, also manuals, boxes and discs £700. Tel. (0707) 320723 after 8pm.

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Technical Queries

Dear Sir,

Can you please explain the difference between Exec files and Obey files. They appear to be used interchangeably on some occasions.

Indeed, the contents of these two file types can sometimes appear to be very similar. Essentially both are examples of command files, where a named file will contain a list of commands of some kind. There are also two commands, *Exec and *Obey, which have functions related to these corresponding file types.

In fact, RISC OS distinguishes an Exec file from an Obey file by its *filetype*, &FFE for an Exec file, and &FEB for an Obey file. Most users will probably not need to worry about the exact values used, but if necessary the required value can be specified for a file using the *SetType command (or use the Set-Type application from RISC User Volume 3 Issue 3, also included on the new Desktop Applications disc).

There is one fundamental difference between an Obey file and an Exec file: the commands in an Obey file are sent directly to the operating system, and thus all the commands included in an Obey file must be star commands (though the star is omitted) which will be recognised by your system as configured (i.e. commands could include some recognised by modules loaded after you switch on your machine).

The contents of an Exec file will be sent to the system as though they had been typed in from the keyboard (technically they are placed into the keyboard input buffer), and what will be recognised will therefore be relevant to the context. For example, if you are inBasic when an Exec file is run, it could contain Basic commands because they would be recognised in that context. Star commands would have to be preceded by a '*' because that is how star commands are typed in in that environment.

An Exec file could also contain user data relevant to an application being run. For example, an Exec file might specify all the commands to run a database system to specify a standard job, such as the creation of a name/telephone list in name order

from a database of more general information. Thus an Exec file is much more likely to contain commands and data relevant to the program or environment in which it is used. An Obey file will always contain commands relevant to the CLI.

Both Exec and Obey files can be created very simply with Edit. Install Edit on the Icon bar, and then press the mouse Menu button over its icon. Select Create followed by *New Command* file to create an Exec file, or *Create* followed by *New Obey file* for a file of that type. In both cases a window is opened into which you can type relevant commands. Pressing the Menu button over the window reveals a *Save* option which will automatically save the file with the correct file type.

The commonest examples of Obey files appear in application directories (those with a name beginning with a '!'). Double-click on any application directory (there are plenty on the Applications discs supplied with your machine) while holding down Shift. You should then see a file called !Run and quite likely one called !Boot. Both of these are examples of Obey files, and either may be examined by dragging its icon to Edit installed on the icon bar. A !Boot file contains commands which will be executed when the directory viewer is first opened, the !Run file the commands which will be executed when the application is run (by double-clicking on its icon).

A typical !Run file (for an application !Name) will look like this:

```
Set Name$Dir <Obey$Dir>
WimpSlot -min 16K -max 16K
Run <Obey$Dir>.!RunImage
```

The first line creates a so-called system variable (Name\$Dir) which is set to the pathname for the application (contained automatically in Obey\$Dir), the second specifies the amount of memory the application requires, and the third runs the program itself (by custom called !RunImage). Other Obey files may well contain further appropriate commands.

More detail is given in the RISC OS User Guide under the heading *Command scripts*. RU



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Philips 8833	£225	300 2 Slot Backplane	£37
Mono Monitor	£73	300 4 Slot Backplane	£59
Monitor Stand	£29	300/400 I/O Podule	£79
A3000 User Port & Midi	£49	300/400 Midi Podule	£65
Serial Upgrade	£19	300/400 3.5" Drive	£115

A3000 3.5" SECOND DRIVE



The kit consists of a 3.5 inch floppy disc drive, data cable, power cable, metal case (cream coloured), an

interface carrier board and full fitting instructions. You will be required to take the current drive out of the A3000 and replace it with the interface carrier board (unlike some add-on drives, you can still use your internal podule socket). The original drive then fits in the case with the second drive and the case is connected to the A3000 with two cables. As the connectors are detachable, the unit can be easily disconnected from the computer if the need arises.

£125

A3000 5.25" SECOND DRIVE



The kit and assembly are similar to our 3.5" kit except the case is larger and the mechanism is a high quality TEAC 5.25" drive. The drive (unlike some you can buy) is also buffered to Acorn specifications so eliminating the possibility of damage to your A3000 (buffering is not required for an additional 3.5" drive).

£169

JET SET PACK

**No Monitor
Needed!
TV Modulator
Included**

A3000 with "monitor quality" adaptor eliminates the need to purchase a dedicated monitor. Comes with four games - Interdictor, Superior Golf, Trivial Pursuit and Euclid.

£649

SOFTWARE

1st Word+	£65
Minerva Home Accts	£79
Minerva Bus. Accts	£305
Minerva Multistore	£228
Acorn Desktop Pub	£121
Acorn View	£42
Clares ProArtisan	£82
Clares Artisan 2	£49
Colton Pipedream	£80
Colton Pipedream 3	£119
Shareholder	£160

This is a small selection of the software that we can supply at competitive prices. Please call for any item you require.

TELETEXT

THE BIGGEST SELLING ADAPTER

The Morley Teletext Adapter is now available for the Archimedes. Advanced specifications, include digital tuning, screen dumps etc. Connects via the external podule socket or our Analogue/User Port



Existing users of our BBC Teletext Adapter can have the unit converted to an Archimedes version for £35

LEADS & MISC. HARDWARE

SCART Monitor Lead	£8	80 col Printer Stand	£15
9 Way Msync Lead	£8	132 col Printer Stand	£19
Arch Serial Lead	£8	A3000 Monitor Stand	£29
Printer Lead	£6	Tilt & Swivel Stand	£11
2 to 1 Printer switch	£20	Eprom Eraser	£18
3 to 1 Printer switch	£30	Eraser with Timer	£23
4 to 1 Printer switch	£36	5.25" Discs x 10	£5
64k Printer Buffer	£115	3.5" Discs x 10	£10
256k Printer Buffer	£199	27128 Eproms	£4.20

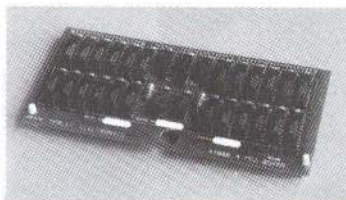
FURTHER INFORMATION

A catalogue of our products is currently available. Please call or write if you require this or further information on any A3000 or Archimedes product.

O.N.I.C.S. L.T.D

MEMORY EXPANSION

THE BEST VALUE MEMORY UPGRADES



Unlike most other upgrades, our 1MB upgradeable card can be upgraded with another 2MB (4MB total in machine) at a later date for maximum flexibility. Furthermore, our card can be upgraded without throwing away the memory that you already have on the card.

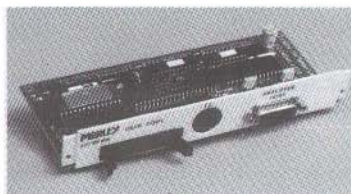
A3000 1 MB Expandable	£99
A3000 1 MB Non-Expandable	£69
A3000 3 MB Upgrade	£239
A3000 1 MB to 3 MB (free fitting)	£160
305 1/2 MB	£69
400 Series 1 MB	£69
400 Series 3 MB	£199

- Fully compatible with all Acorn software.
- A must for all serious Archimedes owners.
- Make full use of powerful RISC-OS packages.
- Can use extra RAM as a second drive.

A3000 BBC Analogue & User Port Podule

Full specification BBC analogue and user port. The analogue port is accessible using ADVAL from BASIC5 with all BBC OSbyte calls supported.

£69



Interface software written by Acorn for maximum compatibility with the BBC.

HARD DISK DRIVES

ST506 HARD DISK DRIVE UNIT



INTERFACE

ST506 Podule Kit £149

A3000 DISK DRIVES

Including ST506 Podule, cased drive with power supply, cable & leads

20MB £399

40MB £499

55MB £619

CALL FOR 300/400 PRICES

Compatible with Acorn's ADFS. 16 bit interface for extra speed. Drive mounted in separate colour coordinated case with switched mode power supply and fan.

Complies with Acorn's new recommendations on RF emissions.

SCSI HARD DISK DRIVES

INTERFACES

A3000 SCSI Pod. £149

300/400 SCSI Pod. £169

SCSI DISK DRIVES

Including SCSI Podule, drive, cable & leads.

A3000 drives also include case and power supply.

A3000 20MB £399

A3000 40MB £549

A3000 60MB £699

300/400 20MB £349

300/400 40MB £475

300/400 60MB £600

Please call for prices on larger drives for A3000 or 300/400



MORLEY

E.L.E.C.T.R.O.N.I.C.S. L.T.D

Morley House
West Chirton
North Shields
Tyne & Wear
NE29 7TY

Tel (091) 257 6355
Fax (091) 257 6373

Shop hours:
9am to 5:30pm (Mon-Fri)
10am to 4pm (Sat)

Acorn

We are an Acorn dealer and service centre. If you would like to have a look at the A3000 or any other Acorn/Morley product please feel free to call in and discuss your requirements with our staff.

If there is anything you require which isn't advertised, please ring for a competitive quote.

How To Order....

BY POST: Enclose cheque made payable to MORLEY ELECTRONICS LTD.

BY PHONE: By quoting your ACCESS or VISA card number.

CARRIAGE: £1 on most orders. £3 on larger items. Hard Disks, Computers + Monitors £10 (carrier).

VAT: UK customers please add 15% to cost incl. carriage.

GOODS USUALLY DESPATCHED BY RETURN.

Government and Education orders welcome.

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RISC User & BEEBUG

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All subscriptions, including overseas, should be in pounds sterling. We will also accept payment by Connect, Access and Visa, and official UK orders are welcome.

Please note that new subscription rates are £1.50 more than renewals.

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We intend to maintain stocks of back issues. New subscribers can therefore obtain earlier copies to provide a complete set from Vol.1 Issue 1. Back issues cost £1.20 each (£1.60 for Volume 3.) You should also include postage as shown:

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 60p
 30p

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The programs from each issue of RISC User, together with a number of additional items, are included on a monthly 3.5" disc. This will be available to order, or you may take out a subscription to ensure that the disc arrives at the same time as the magazine.

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 Six months subscription
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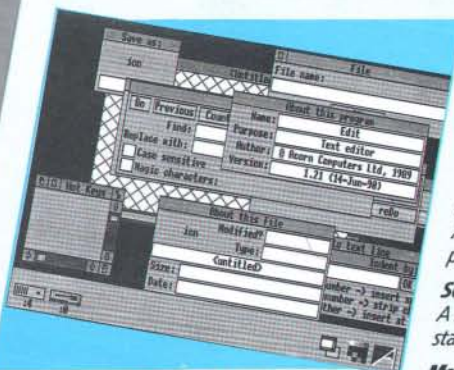
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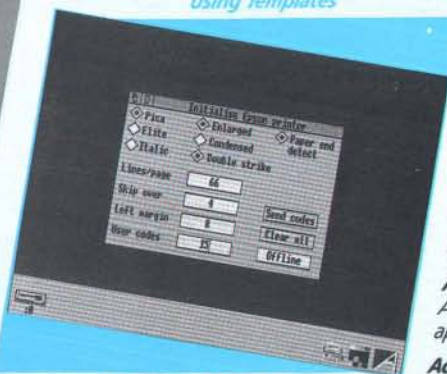
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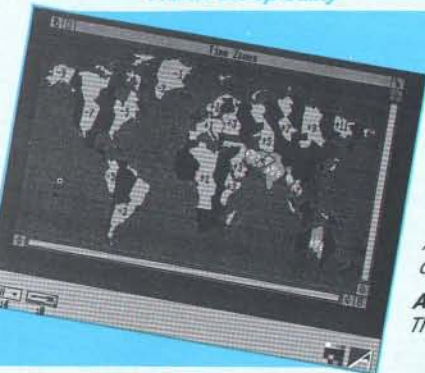
RISC USER MAGAZINE DISC CONTENTS



Using Templates



Printer Set-Up Utility



Time Zones

PROGRAMS IN RISC USER JANUARY/FEBRUARY 1991 **A First Look at Bezier Curves**

Three listings demonstrating the use of different mathematical methods for drawing curves.

A Multi-Tasking Wimp Debugger

A multi-tasking application, which allows you to debug Wimp-based programs while testing and running them.

Scrolling Stars

A short routine which provides a fascinating 3D display of scrolling stars.

Mastering the Wimp (Using Templates)

A simple Wimp application demonstrating the use of templates.

ADDITIONAL PROGRAMS DESCRIBED IN THE MAGAZINE

Ideas Processor

This application is designed to aid planning of letters, projects and reports by providing a hierarchical structure for your ideas.

Making the Most of Your Multi-Sync Monitor

An enhanced version of the screen mode definer (Vol.3, No.4) and the four new screen mode modules described in the article.

BONUS ITEMS

ArcLight

An animation produced with ArcLight, and a copy of the PD application Projector which allows you to view it.

Acorn's New Printer Drivers

Two of the printer drivers described in this article: PrinterDM and PrinterLx.

FormEd

The latest version of Acorn's template editor, a multi-tasking application for designing windows and icons.

Printer Set-Up Utility

A multi-tasking utility which allows you to set up various functions on your printer before use.

Time Zones

A colourful map showing the time anywhere in the world in comparison with GMT.

ArcScan Data

The ArcScan data files for this issue of RISC User and BEEBUG Vol.9 No.7.

Special Offers to RISC User Members - Jan 1991

Each month RISC User will include a list of special prices for BEEBUG's own Archimedes software, available only to RISC User members.

Code	Product	Members Price	inc. VAT	Code	Product	Members Price	inc. VAT
1406a	Volume 3 Special Disc	4.75		0104a	DFS Reader RISC OS upgrade	2.40	
PDA1	Desktop Applications	9.95		0106c	Hard Disc Companion	35.00	
PAOM	ArcOmnibus Games	9.95		0101d	Hearsay	51.75	
PAS3a	ArcScan III (complete)	14.95		0103a	Hearsay RISC OS upgrade	4.40	
PAU3a	ArcScan III (upgrade)	4.75		0107c	ISO C Dev. System	79.00	
1410a	RISC User Movie Maker	4.75		0100c	Masterfile Archimedes	16.50	
1401a	RISC User Toolbox (Arch.)	5.75		0111b	Outline Font Pack 1	49.50	
2420b	RISC User Binders	4.20		0108d	Ovation (Beebug DTP)	99.00	
0102b	DFS reader	9.90		0796c	Serial Link	17.25	
				0105a	Serial Link RISC OS upgrade	2.40	

OTHER MEMBERS OFFERS

Wherever possible we will attempt to include details here of items upon which we have negotiated a special deal. These offers will only be for a limited period while stocks are available.

Logistix

RRP £99.00

Offer price £29.95 (inc VAT) + £4.50 p&p

Logistix from Acorn is an Archimedes version of the popular PC package of the same name. Two large manuals cover its many features which include a macro language and a graph facility.

Stock Code 1984e

New Year's Sale

**Please phone for details of our
New Year's Sale
of new and reconditioned
equipment:**

St. Albans (0727) 40303

Twin

RRP £29.00

Offer price £18.95 (inc VAT) + £1.50 p&p

Archimedes Twin is a professional programmers' text editor and has been designed for quick and easy program development. Twin can be used with all Archimedes programming languages, including ANSI-C, Fortran 77, ISO Pascal, BASIC and Assembler. Structure templates can be created to lay out routines and procedures in the correct format for the language in use.

Stock Code 1083b

Software Developer's Toolbox

RRP £199.00

Offer price £29.95 (inc VAT) + £3.50 p&p

The Toolbox contains the Archimedes Symbolic Debugger and a set of other utilities which have proved their value at Acorn's Research and Development Centre in Cambridge. The Debugger helps trace bugs in the source code of programs written in Archimedes ANSI C, Fortran 77 and ISO Pascal.

Stock Code 0918